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in epilepsy

PREREQUISITE FOR EMOTIONAL ADJUSTMENT: THERAPY

"The most effective form of psychotherapy is to demonstrate to the patient that his seizures can be adequately controlled by the use of anticonvulsant medication."

REQUISITE FOR THERAPY:

THE PARKE-DAVIS FAMILY OF ANTICONVULSANTS

effective anticonvulsants for most clinical needs

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Editorials

News Item

The Council and the House of Delegates of the Oklahoma State Medical Association on successive days voted overwhelmingly against the ad hoc committee's report which embodied a service contract for medically indigent people over 65. There was no apparent willingness to compromise over irritations that might permit some kind of solution consistent with the American Medical Association's request. The members of both bodies who spoke seemed unconcerned about the philosophic implications of the April meetings which led to the committee's work —only about those facets of the plan which affected each adversely. The idea of a service contract which in April the committee had been asked to work on was now almost unanimously abhorent.

Editorial Comment

Mr. Lincoln believed that people anywhere have a right to revolutionize when it seems wise and proper for their own good. The people of the United States have done this all along, peacefully, through constitutional amendments, through laws and through the right of eminent domain.

When I was a boy in Tennessee, the roads in our county were a part of private enterprize. There was a toll gate every five miles and we payed a fee at each gate before the gate keeper would raise the gate. The people decided that they, through the state could do a better job and the state took over the road business. This is a little revolution against private enterprise. Our history is replete with them. The people did another thing to protect themselves, another revolution against private enterprise; they fixed it so that no combine could exploit them by controlling prices with the Sherman Anti-Trust law; and where it was necessary for a monopoly to exist such as utility services they established commissions to set rates which would allow legitimate profits but no more. All through our history the people through their government have taken the steps they have thought necessary to promote the interest of the people as a whole by little revolutions against inadequacies of and exploitations by private enterprise. We may question the validity and wisdom of some of the things they have done, but I doubt if we can question their right to do them. In many instances the revolution has involved attacks on services that were essential to all the people. People no longer have the freedom to dump garbage and refuse where they please. Outdoor privies are not allowed in urban communities. Even litter-bugs are subject to fine. Little by little individual freedom of action and whim has had to give way to systems designed for the good of all the people. This is the history of social and economic development of America.

Now comes the matter of health. The physician has the freedom to use his judgment, good or bad, with his patient—the only restriction the people have placed on him is that he must have a license which means that he has to demonstrate certain qualifications. The license is archaically broad and permits him to do anything in the way of treatment that he thinks he is man enough to do—the only limitation is a liability to damages if something goes wrong and he cannot demonstrate that he used the knowledge and skill equal to that used by the other physicians in his community. The physicians, medicine, medical education and the hospitals have done much to offset this archaic license system, otherwise the system would have been done away with as special skills became more and more necessary for adequate medical care; but this is a very vulnerable part of our structure to revolution, and it appears that the United Mine Workers and perhaps others have already started one. Freedom of unlimited choice is being examined with a good deal of hard scrutiny, and is in many areas of third party medicine not acceptable.

The health and medical care of the indigent and the medically indigent are of con-

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cern to a good many people besides those who fit this classification. This area is wide open for a revolution and when it comes it will be the people who are responsible not the politicians and the bureaucrats however much we may scream that it is. To oppose as bitterly as it apparently does the socialization of medicine and yet be willing to give nothing to prove that it is neither necessary nor desirable is a paradox existing in the minds of the House of Delegates that cannot be fathomed by any reasoning that would result in a charitable conclusion. *The question is not the creation of a stop-gap to prevent the passage of Forand-type legislation but can we or can we not embrace all the people under our private enterprise system of medical care.* Can we of our own volution devise a tool to prove that it can be done. It appears that we either cannot or will not.

It is a pity that those who hate government interference most should be the ones who will make the people find it necessary, when all they need do is agree to give up depredatory privileges which very few would exercise anyway. If they would agree to give up this privilege then arbitration for the adjustment of inequities could proceed and could be continuous, for it would be we and not government who would be forging the tool for the assured care of the medically indigent over 65 under the best system of medical care in the world. To retain this privilege for the avaricious few we wash our hands of the whole affair and in effect tell the people that our system cannot assure access to good medical care to this marginal group. We would like for them to be covered by some sort of indemnity insurance but we will not promise them that their needs for physicians fees will in this way be met but it should help.—*B.H.N.*

A Sleepy Giant?

Recent Forand Bill Hearings before the House Ways and Means Committee provided Oklahoma doctors with an opportunity to dispell the theory that medicine is but a voice in the wilderness when it comes to politics.

The OSMA's National Legislative Committee successfully tested its muscles when it marshalled over five hundred protests to this measure. Oklahoma Congressmen not only heard from physicians, but also from businessmen, civic leaders and other professional people.

The late-session public hearings were but a feint on the part of those who are ambitious to regiment health care. Physicians should not let their fine showing lull them into a false sense of security—the real test on this legislation will likely come in 1960—or surely in 1961!

At the same time, the Oklahoma committee should be proud of the enthusiasm it recently generated, both from within and without the profession. A powerful potential has been rekindled from men who have too often underestimated their own bargaining power.

Oklahoma medicine is a sleepy if not sleeping giant that, when stimulated, can do much to mold sound public opinion. It is incumbent upon each of us to take cognizance of the world around us and to let ourselves be heard on legislative matters.

The Forand Bill is not only a poor palliative for the indigent elderly, but also represents another example of wasteful sniping at the taxpayer's pocketbook. A continuing battle must be waged against this legislation and the taxpayers must understand the foreboding implications which are deceptively buried under promises of a "blue sky" medical care program. We must assume a leadership role on behalf of our senior citizens and help them meet the challenge of aging through the free enterprise mechanism.

Our National Legislative Committee will continue to watch Forand's maneuverings and will be calling upon you to help them build even more effective legislative machinery. The following men of this committee merit your continued cooperation:

Worth N. Gross, M.D., 1st Congressional District; Tom S. Gafford, Jr., M.D., 2nd Congressional District; J. Hoyle Carlock, M.D., 3rd Congressional District; Clint Gallaher, M.D., 4th Congressional District; William N. Harsha, M.D., 5th Congressional District; and Paul B. Lingenfelter, M. D., 6th Congressional District.—*J. R. Stacy*

Scientific Articles

A Ten-Year Experience With Caesarean Section in a 50-Bed Hospital

BEVERLY C. CHATHAM, M.D.

Beverly C. Chatham, M.D., graduated from Vanderbilt University School of Medicine in 1943. He is certified by the American Board of Obstetrics and Gynecology.

Doctor Chatham is a member of the Central Association of Obstetrics and Gynecology, the American College of Obstetrics and Gynecology and the American College of Surgeons.

DURING THE PAST twenty years Caesarean Section has become a commonplace operation and one now used in preference to an anticipated difficult vaginal delivery. Whether this is proper or not is the province of the teacher rather than the present writer.

The experience over ten years in a fifty-bed general hospital, serving an area of thirty thousand population, should throw some light on what is being done outside the larger centers and teaching institutions. If the experience here is good, then those people who trained us have not worked in vain, and the lay public should have no doubts as to the quality of operative obstetrics they are receiving. Furthermore, if the results are satisfactory, more younger physicians should be happy to settle in such communities because what they have been taught is being carried out in the smaller communities of our State.

We, therefore, present this review to show our community as an example of medicine practiced outside the metropolitan areas of our State. We are certain other small institutions could present equally as good, if not better, figures than ours.

Table One shows the incidence, by year, of sections along with the maternal and fetal mortality. These procedures were done by four different surgeons. The author did slightly less than 50% of them.

TABLE ONE

Year	No. Deliveries	No. of Sections	% Sections	Maternal Death	Fetal Death
1949	260	8	3.0	0	1
1951	256	8	3.1	0	0
1950	244	11	4.5	0	0
1952	279	5	1.7	0	1
1953	257	7	3.1	0	0
1954	282	6	2.1	0	0
1955	329	9	2.7	0	0
1956	338	9	0.8	0	0
1957	369	7	1.8	0	0
1958	309	7	2.5	0	0
Total	2,923	Total 72	Avg. 2.5%	Total 0	Total 2

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There were no maternal deaths; in fact, there was no mother who at any time caused us any great degree of worry as to her outcome. Two mothers left the hospital without babies; (1) a markedly premature infant from a case of placenta praevia centralis, (2) a stillborn infant from a case of massive abruption of the placenta (the infant was dead before the section was started).

Table Two shows the maternal morbidity and the number of patients each year receiving and not receiving antibiotics during puerperium. These figures are a revealing set because they show that section carries a very high morbidity rate, albeit a zero mortality rate. If our antibiotics become less and less effective we again may be doing difficult vaginal deliveries in preference to Caesarean Sections.

TABLE TWO

Year	Maternal Morbidity	Antibiotics Used	No Antibiotics Used
1949	1 in 8 cases	5	3
1950	2 in 11 "	7	4
1951	2 in 8 "	7	1
1952	2 in 5 "	5	0
1953	0 in 8 "	6	2
1954	3 in 6 "	5	3
1955	0 in 9 "	5	4
1956	0 in 3 "	0	3
1957	0 in 7 "	1	6
1958	2 in 7 "	4	3
Total	12 in 72 = 16.6%	43 = 59.8%	29 = 40.2%

Before reviewing these figures, I felt we had been brave in our use of antibiotics (this covers both sulfonamides as well as antibiotics), but I found to my dissatisfaction that we used these drugs very liberally, and I now wonder if they were as necessary as we thought at the time. This much can, however, be said—we did not start anyone on these drugs prophylactically—they were all given on indication.

Table Three shows the type of section done and the number of patients receiving blood transfusions.

TABLE THREE

Year	Classical	Low Segment	Transfusion
1949	2	6	2
1950	0	11	1
1951	0	8	2
1952	0	5	4
1953	2	5	2
1954	1	5	1
1955	2	7	3
1956	1	2	0
1957	0	7	2
1958	1	6	2
Total	9	63	19 = 26.3%

The Classical Sections were done for two reasons: (1) in the presence of placenta praevia and (2) when fast action was indicated—such as an abruption of the placenta or in fetal distress. Transfusions were given only on these indications:

(1) Bleeding of severe nature with shock

(2) Hemoglobin below 10 grams per cent

No transfusions were used as "tonics," and there were no transfusion reactions other than slight "pyrogenic reactions."

Table Four shows the type of anesthetic used.

TABLE FOUR

Year	Local	Spinal	General
1949	2	6	0
1950	0	11	0
1951	0	8	0
1952	3	2	0
1953	1	7	0
1954	1	5	0
1955	0	9	0
1956	1	2	0
1957	1	6	0
1958	1	6	0
Total	10	62	0

We feel very strongly about not using general anesthesia. So strong is our feeling that we will not do a section under general anesthesia where we are expecting a live baby. We have had no more serious untoward reactions from spinal than headache. We have had no problems with local anesthesia. In using either local or spinal anesthesia, pentothal is added after the cord has been clamped. This makes for an easier closure following emptying and suturing of the uterus.

Table Five shows the incidence of first and repeat sections.

TABLE FIVE

Year	First	Repeat
1949	2	6
1950	6	5
1951	5	3
1952	2	3
1953	5	3
1954	4	2
1955	3	6
1956	0	3
1957	1	6
1958	2	5
	—	—
Total	30	42

Our feeling has been and is that "once a section, always a section" is the best for our small hospital. We believe people can be delivered vaginally after section if facilities are immediately available for section during the trial labor. Our emergency surgical set-up requires about an hour's notice. We believe an hour might mean the difference between a live baby or a live mother if the uterus should rupture during this trial of labor.

The reasons that we did our first sections reflect clearly our philosophy about Caesarean Section:

1949: (1) Placenta Praevia
(2) Cephalo - pelvic disproportion — trial labor

1950: (1) Diabetic Mother
(2) Abruption of Placenta
(3) Cephalo - pelvic disproportion— first delivery vaginal with spastic child
(4) Cephalo - pelvic disproportion — trial labor
(5) Cephalo - pelvic disproportion — difficult first delivery, stillborn infant
(6) Placenta praevia

1951: (1) Uterine inertia
(2) Difficult first delivery — stillborn child
(3) Prolapse cord, breech, 5 cms. dilatation
(4) Placenta praevia
(5) Age 43, breech, first pregnancy

1952: (1) Severe preeclamptic; unresponsive to treatment
(2) Severe abruption of the Placenta

1953: (1) Cephalo-pelvic disproportion; difficult first delivery, stillborn child
(2) Severe preeclampsia; failed medical induction
(3) "Past 40"—no children living
(4) Prolapse of cord—not in labor
(5) Abruption of Placenta

1954: (1) Cephalo-pelvic disproportion; trial labor
(2) Cephalo-pelvic disproportion; trial labor
(3) Prolapse cord; not in labor
(4) Uterine inertia

1955: (1) Placenta Praevia
(2) Questionable disproportion; questionable inertia
(3) Diabetic Mother

1956: No primary sections

1957: (1) Transverse lie; back over inlet

1958: (1) Placenta Praevia and abruption; spastic infant
(2) Past 40—first pregnancy, schizophrena, antropoid pelvis

In closing, a few interesting sidelights were found: All patients were white (we do deliver Negro women, however). Three hysterectomies were done:

(A) One for fibroids
(B) Two for ruptured uteri unsuitable for suture

Three associated appendectomies — no unusual course postoperatively
Thirty had tubal ligations (Pomeroy)
Shortest stay—5 days
Longest stay—13 days
Average stay—8.4 days
Youngest patient—age 17
Oldest patient—age 43
Average age—27.8 years
Complications:
Most frequent—urinary tract infections
Most serious—ileus requiring suction
No wound disruptions
No emboli
No thrombophlebitis

Summary

A ten-year review of sections done in a small hospital shows that our results are comparable to those in larger centers and that the indications for sections are about the same wherever medicine is practiced.

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A review of the extensive literature on the subject.

PLEURAL EFFUSION:

A Study of the Literature

JAMES R. LOWELL, M.D.

A graduate of the University of Oklahoma School of Medicine in 1953, James R. Lowell, M.D., limits his practice to his specialty of Internal Medicine. In addition to his private practice, he is an Instructor in Medicine at his school of graduation.

Doctor Lowell is a member of the American Trudeau Society.

Introduction

PLEURAL EFFUSION is a not uncommon clinical condition which may often be overlooked but, even when discovered, frequently poses difficult problems as to the diagnosis of the underlying cause and its subsequent therapy. Also, there are many aspects which do not seem to be widely known or fully appreciated. It is therefore hoped that a study of the literature might serve as a review, in depth, of the current knowledge and thinking concerning pleural effusions and bring more light upon these less well-known aspects.

The "pleural space" is only a "potential" space with normal contents of only a few cubic centimeters of fluid necessary for lubricating purposes. This fluid is formed by transudation and is removed via the lymphatics. Therefore, an obstruction to lymphatic drainage as well as an increased production of fluid may cause an abnormal amount of fluid. Anything which might cause edema in other parts of the body may cause effusion into the pleural space.[1] The fluid in cases of pleural effusion is not "static" but there is a constant turnover which, when measured by deuterium oxide or T-1824 dye methods averages about 45%/hour.[2]

The pleura is a membrane enveloping the entire lung and interior surface of that part of the thorax which is adjacent to the lungs. Throughout this great area the pleura, itself, is only *one cell thick.* Therefore, any condition causing pleural effusion—or, for that matter, affecting the pleura (except mesothelioma)—must involve structures other than the pleura. A severe pleurisy may be present but it is associated with some pneumonitis. Metastatic carcinoma may produce an effusion but it inevitably also involves some lung or subpleural tissue. Tubercle bacilli may be present in the pleural space and cause considerable exudation but they originated in the lung or other areas such as a paravertebral abscess. Therefore, it is imperative to always consider pleural effusion as a manifestation of disease which is *not* exclusively in the pleura and *not as a disease entity.*

Etiology

There are many causes of pleural effusion but the exact number would be dependent upon how one would want to classify disease entities—a formidable task not undertaken here. Reference to Table I will show many of the more common causes which have occurred in five series of cases studied in recent years. From this Table one can

STUDIES OF ETIOLOGIES OF PLEURAL EFFUSIONS

	Tinney and Olsen[3]		Engelhardt and Wilson[4]		Sahn et al[5]		Leuallen and Carr[6]		Myerson[7]	
Neoplasms	169		10		47		229		41	
Carcinoma										
Bronchogenic		47				25				25
Breast		42				9				
Unknown primary		14				4				
Ovary		12				1				
Colon and Rectum		4				3				2
Kidney		6				1				
Stomach		5								
Others		11				2				7
Lymphoma and Leukemia		28				2				7
Infections	40		53		9		43		27	
Pneumonia		16		32		7				12
Tuberculosis		24		21		1				10
Empyema						1				5
Congestive Failure	42		23		36		44		18	
Miscellaneous	23		5		11		45		13	
Cirrhosis and Hepatitis		8		1		3		9		2
Pulmonary infarction						2		13		2
Renal disease		7		1		1		1		3
Trauma						2		5		1
Subphrenic abscess		1				1		4		1
Lupus erythematosus		1						4		1
Polyserositis								5		1
Others		6		3		2		4		2
Undetermined	170		57				75		1	
Totals	444		148		103		436		100	

TABLE I

also obtain a general—but certainly not exact—incidence of the various causes of pleural effusion. This is because no two studies have accepted the same criteria for case selection, or had very similar case material. Tinney and Olsen's[3] study from the Mayo Clinic excluded cases due to surgery, trauma or of undetermined etiology. The material they present concerns 274 *diagnosed* cases from a total of 444 cases. They state that in 170 (38%) of the 444 cases a definite diagnosis could not be made. Engelhardt and Wilson's[4] cases were "non-surgical" cases from New Orleans' Charity Hospital. Sahn et als',[5] series came from institutions *not* admitting known cases of tuberculosis and all of the patients were past 50 years of age. These factors make carcinoma appear to be a more common cause of pleural effusion than it actually is. Leuallen and Carr's[6] cases are from the Mayo Clinic, but were collected during the 1950- '52 period—significantly later than Tinney and Olsen's. They excluded cases secondary to surgical procedures. Myerson's cases[7] were all men at a Veteran's Administration hospital.

From studying the above five series of cases, and keeping in mind the case selection factors, it will be seen that *neoplasms*, particularly carcinomas, are the cause of almost half the cases of pleural effusion. The remaining causes are in three roughly

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equal groups classified as *infectious, congestive failure* and *miscellaneous.* Cirrhosis, renal diseases and pulmonary infarction are among the more common causes in the large miscellaneous group. In Table II are listed almost all the causes of pleural effusions. These are listed as near in order of decreasing frequency as is consistent with an outline form of presentation.

TABLE II

OUTLINE OF ETIOLOGIES OF PLEURAL EFFUSIONS

I. Neoplasms
  A. Primary
    1. Bronchogenic carcinoma
    2. Lymphomas and leukemias
    3. Mediastinal tumors
    4. Chest wall tumors
    5. Mesotheliomas
  B. Metastatic (especially breast and ovary)

II. Infections
  A. Tuberculosis
    1. Pulmonary tuberculosis
      a. Without obvious pulmonary tuberculosis
      b. With obvious pulmonary tuberculosis
    2. Tuberculous spondylitis
    3. Tuberculous lymphadenitis
  B. Bacterial (non-tuberculous)
    1. Pneumonia
    2. Pulmonary abscess
    3. Infected pulmonary cyst
    4. Subphrenic abscess
    5. Bronchiectasis
    6. Tularemia
    7. Brucellosis
    8. Anthrax
    9. Syphilis
    10. Typhoid fever
    11. Scarlet fever
  C. Mycotic
    1. Coccidioidomycosis
    2. Actinomycosis
    3. Blastomycosis
    4. Torulosis
  D. Viral and Rickettsial
    1. Atypical pneumonia
    2. Psittacosis
    3. Q fever
    4. Others
  E. Protozoal
    1. Amebiasis
    2. Trichinosis
    3. Paragonomiasis
    4. Echinococcosis

III. Cardiovascular
  A. Congestive heart failure
  B. Pulmonary embolism
  C. Pulmonary edema
  D. Superior vena cava obstruction
  E. Pericardiopleuritis (including "Post-myocardial-infarction syndrome")

IV. Miscellaneous
  A. Cirrhosis
  B. Nephritides and nephroses
  C. Fluid overloading
  D. Pneumothorax
  E. Trauma
  F. Thoracotomy
  G. Postpartum
  H. Biliary surgery
  I. Rheumatic fever
  J. Perforated esophagus
  K. Pancreatitis
  L. Lupus erythematosus
  M. Anemia
  N. Polyarteritis nodosa
  O. Rheumatoid arthritis
  P. Endometriosis
  Q. Wet beriberi
  R. Porphyria
  S. Acute interstitial pulmonary fibrosis
  T. Scurvy
  U. Meig's syndrome
  V. Loeffler's syndrome

Diagnosis

The clinical presence of pleural effusion almost always signifies a condition of great medical importance, even potentially fatal. Never should a patient be dismissed with the diagnosis of "just pleurisy." Early diagnosis may be life-saving, prevent or reduce a long term illness, prevent thoracotomy, eliminate much mental anguish or considerably reduce discomfort. In spite of a wide range of diagnostic procedures, it may be impossible to diagnose some cases but even the majority of these "idiopathic" cases should have a careful program of handling —as will be seen later.

Symptoms and Signs

The onset of pleural effusion may be very insidious with a gradually increasing shortness of breath being the only complaint. However, frequently there is a fibrinous pleurisy accompanied by pleuritic pain and the serofibrinous pleurisy (pleural effusion) follows within a short time. As the effusion develops the pleuritic pain rapidly subsides.

Pleuritic *pain* is a severe, sharp, or cutting pain which increases with inspiration and gradually subsides with expiration. Holding the breath in expiration will alleviate the pain. Usually the afflicted individual can, with concentration, move a normal tidal volume of air if he begins from the maximal expiratory position. Attempting to move an equal amount of air from the usual resting expiratory level causes so much pain that his breathing is "cut off." Coughing and sneezing are suppressed as much as possible due to the excruciating pain they cause.

Only the parietal pleura is sensitive to pain. The pain is generally felt over the area of involvement and sometimes distally along the courses of the intercostal nerves involved. This sometimes causes the simulation of abdominal diseases in pleurisy. Rarely the pain may be felt only in the abdomen.

The periphery of the diaphragm is innervated by intercostal nerves whereas the central portion is supplied by the phrenic nerve. Therefore, pleurisy over the peripheral part of the diaphragm will be felt in a corresponding region in the lower thorax whereas pleurisy over the central part will be referred to the shoulder of the same side. Simultaneous pain at the lower thorax and ipsilateral shoulder is almost pathognomonic of diaphragmatic involvement. It has been previously mentioned, but should be further stressed, that in generalized pleurisy the pain is much worse at the lower thorax than the upper.

Fever is usually present at time of pleuritic pain and during the earlier stages of pleural effusion it may be present, depending upon the cause. A temperature of 100°F., or greater, associated with pleural effusion was found in only three of 24 neoplastic cases but in 17 of 24 tuberculous cases.[8] Fever is to be expected when the effusion is associated with pneumonia or when empyema is present.

Dyspnea may be the only symptom of pleural effusion. If there is considerable pleuritic pain the dyspnea may be due, at least in part, to a self-imposed limitation of respiratory excursions. Dyspnea more often is due to "restriction" of the lungs and is, therefore, somewhat related to the volume of fluid. However, relief from draining relatively small amounts of fluid is often gratifying even in patients with good underlying pulmonary function.

In patients with large pleural effusions a persistent, essentially nonproductive *cough* is often noticed. This is probably due to the large effusion bringing bronchial walls into apposition and initiating the cough reflex.

Physical examination can best be discussed by the classical method of division into inspection, palpation, percussion and auscultation.

1. *Inspection.* The patient with severe pleuritic pain will usually be seen lying on the affected side and if there is any tendency to cough or sneeze this will be stifled. There is splinting of the affected side with decreased expansion. With the advent of effusion there may still be some limitation of motion of the chest. Instead of appearing concave the intrecostal spaces may be flattened or even bulging and, therefore, Litten's sign of diaphramatic excursion will not be present. If the effusion is large the patient may prefer to sit up to relieve his dyspnea. The cause of the pleural effusion may be indicated by dilated veins on the chest and abdomen due to superior vena cava obstruction, a gibbus of tuberculous spondylitis or clubbed fingers, due to bronchiectasis, empyema or carcinoma.

2. *Palpation.* The outstanding finding upon palpation is the decrease of tactile fremitus on the involved side. The observation of decreased chest expansion on the involved side may be confirmed by palpation. Tracheal deviation away from the involved side is evidence of pleural effusion of rather large amounts. If the effusion is on the left the cardiac point of maximum impulse may be diminished or absent. A right-sided effusion may displace it to the left.

3. *Percussion.* Flatness to percussion on the involved side of the chest at its most basal portion with gradual change to dullness as one progresses upward is one of the characteristic findings of pleural effusion. However, it must be realized that no significant change in resonance occurs unless at least several hundred cubic centimeters of fluid are present. Shifting dullness is a valuable confirmatory sign but is not always present. Percussion may also be used in demonstrating mediastinal shift away from the side of effusion—an indirect sign of effusion which is often not demonstrable. Grocco's triangle of dullness adjacent to the midline on the contralateral, posterior base is of limited value since it is also present in consolidation and atelectasis.[9] If the effusion is on the left the semilunar space of Traube is diminished or disappears.

Just above the level of dullness an area of hyper-resonance or even tympany may be elicited. This is "Skodaic resonance" and

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may also be found above a consolidated pneumonia.[9]

4. *Auscultation.* A friction rub synchronous with respiration may be considered pathognomonic of pleurisy. The outstanding auscultatory finding of pleural effusion is decrease or absence of breath sounds over the fluid. However, breath sounds may be increased when there is underlying consolidation or adhesions.[1] Vocal fremitus is also decreased but this may occur with atelectasis and pleural thickening. If pneumohydrothorax is present the Hippocratic succussion splash may be elicited. Comparable to the Skodaic resonance above the fluid is the presence of egophony and tubular breath sounds.

Pleural thickening is the most difficult condition to differentiate from pleural effusion by means of physical examination. Those findings of value in doing so are asterisked in Table III.

TABLE III

OUTLINE OF PHYSICAL FINDINGS

I. Inspection
  A. Evidence of pleuritic pain
    1. Grunting respiration
    2. Suppression of cough and sneeze
    3. Splinting of affected side
    4. Lies on affected side
  B. Evidence of pleural effusion
    1. Limited chest expansion
    2. Flattening or protrusion of intercostal spaces—Litten's sign absent
  C. Evidence of possible etiology of pleural effusion
    1. Dilated veins on chest—superior vena cava syndrome
    2. Gibbus—tuberculous spondylitis
    3. Clubbed fingers—empyema, bronchiectasis, carcinoma
II. Palpation
  A. Decreased tactile fremitus
  B. Decreased chest expansion
  C. Absence of cardiac point of maximum impulse
  *D. Shift of cardiac point of maximum impulse
  *E. Tracheal Deviation
III. Percussion
  A. Decreased resonance (dullness or flatness)
    1. Dullness or flatness over the fluid
    *2. Shifting dullness
    *3. Shift in mediastinal dullness
    *4. Grocco's triangle
    5. Traube's semilunar space decreased
  *B. Increased resonance—Skodaic resonance
IV. Auscultation
  *A. Friction rub of pleurisy
  B. Over the fluid
    1. Decreased breath sounds
    2. Decreased vocal fremitus
  C. Above the fluid
    *1. Egophony
    *2. Tubular breath sounds
  D. Pneumohydrothorax—Hippocratic succussion

*Of value in differentiating pleural effusion from pleural thickening

Pleural thickening is the most difficult condition to differentiate from pleural effusion by means of physical examination. Those findings of value in doing so are asterisked in Table III.

Clinical Features

Certain clinical features of some of the causes of pleural effusion are worthy of special consideration.

The largest pleural effusions are usually found to be due to malignancies and they often recur rapidly after thoracentesis. Ill health prior to the "final illness" (with effusion) was found to be present in 19 of 24 cases of malignancies in one study whereas it was present in only one of 24 of those which were tuberculous.[8] True pleuritic pain was found to be uncommon or of short duration in malignancies although "a particularly unpleasant boring pain which goes on, most significantly even after the formation of a large effusion" might be present. Clubbing of the fingers suggests empyema, carcinoma[10] or bronchiectasis. Age is an important consideration since most malignancies producing pleural effusions are relatively uncommon before the age of 40. On the contrary, frankly tuberculous and "idiopathic" pleural effusions have a peak incidence at about 20 years.[11, 12]

The effusion associated with congestive heart failure rarely is present without other clinical evidence of the congestive failure. At least three studies have shown that such effusions have a predilection for the right hemithorax.[3, 7, 13] The results of these studies are seen in Table IV. Peak and Levine[13] also found: "Rheumatic heart disease and auricular fibrillation appeared to augment the influences determining a right hydrothorax, while pure left heart failure tended to mitigate these to a limited degree."

TABLE IV

PREDOMINANCE OF SIDE OF EFFUSION IN CONGESTIVE HEART FAILURE

Authors	Right	Left	Bilateral			
Tinney & Olsen[3]	28	13	1			
Myerson[7]	12	5	1			
(noncardiac effusions)	(41)	(39)	(2)			
Peak & Levine[13]						
thoracentesis	55	8	12	R > L	R=L	L > R
x-ray examination	20	4	52	9	14	5
postmortem	6	5	99	85	3	11

In spite of the fact that effusion due to congestive heart failure has a predilection for the right thorax it is, nevertheless, the most frequent cause of bilateral effusions.[5] Uusually an enlarged heart on the chest film will aid in the diagnosis. Rabin and Blackman[14] studied 78 cases in which there was radiographic evidence of bilateral pleural effusion and a *normal* cardiac size. Under these circumstances neoplasms were the most frequent causes of bilateral effusions (44.9%). Disturbances of water and electrolyte metabolism (16.7%), pulmonary embolization (12.9%) and pyogenic infections (3.8%) were other causes. Only 3.8% of these cases were due to congestive heart failure!

With early, adequate antibiotic treatment of pneumonia the occurrence of an associated pleural effusion is unusual. However, even when the patient is apparently recovering satisfactorily an effusion may appear. If there is reappearance of signs of severe toxicity empyema is probably present. Streptococcal pneumonias give rise to particularly large and rapidly recurring effusions.

Effusions due to pulmonary embolizations can usually be readily recognized by a clinical setting of prior thrombophlebitis, surgical operation or chest pain. The fluid is rarely very large in amount and there is continuous, gradual absorption following cessation of embolization.[1]

Tuberculous pleural effusion most commonly occurs prior to the appearance of clinical pulmonary tuberculosis as detectable by ordinary diagnostic means. Later, after there is considerable pulmonary involvement caseous tuerculous material may contaminate the pleural space in large amounts—thus causing a tuberculous empyema.

The mechanism of production of the tuberculous pleural effusion without obvious underlying disease is shown by two studies. Paterson[15] inoculated guinea pigs with nonlethal strains of tubercle bacilli and three weeks later these, as well as control guinea pigs, were injected with virulent tubercle bacilli intrapleurally. He found, "The response to the intrapleural inoculation in the vaccinated animals is immediate and marked. One hour after inoculation there is found some hemorrhagic exudate which is greater in amount than the fluid injected. This increases from day to day, reaching a maximum at the eighth or tenth day after which it is rapidly absorbed." There was little or no such reaction in the control animals. He concluded: "Our experiments show that such tuberculous effusions are not primary but are due to a reinfection either from within or from without, such infection taking place in a pleura rendered allergic by an already existing focus of infection." That such a focus is present was shown by Stead et al,[16] who performed thoracotomies on 24 patients with "presumably tuberculous" but otherwise undiagnosed effusions. They found that, "Fifteen of the 24 patients had clear pathologic evidence of tuberculosis in both the lung and pleura." In 12 of these 15 it consisted of a caseous focus contiguous with the pleura. Hypersensitivity is now well-recognized as playing an important role in the development of tuberculous pleural effusions.[16, 17, 18]

Because hypersensitivity to even a small amount of tuberculoprotein causes the effusion it does not develop until roughly about six months after the tuberculin skin test becomes positive.[19] Also, because tubercle bacilli may be present in relatively small numbers, culture of the fluid is frequently unrewarding. Various authors estimate that tubercle bacilli can be cultured from only 20 to 50% of these fluids.[11, 19, 20, 21]

Tuberculous pleural effusion should be considered to be a complication of pulmonary tuberculosis. In three series 20.6%,[22] 4.8% in chemotherapy treated and 22.5% in controls,[23] and 9.7%[18] of patients with tuberculous pleural effusions later developed pulmonary or extrathoracic tuberculosis. These figures clearly show the necessity of considering this condition as one meriting adequate treatment.

An "idiopathic" pleural effusion is one in which a diagnosis cannot be made in spite of the clinical picture, adequate examinations of sputum (or gastric contents) and pleural fluid for tubercle bacilli and no underlying lung disease which might cause the effusion is present by radiographic examination even after the effusion has cleared. This is not a rare diagnostic dilemma. In 444 cases of pleural effusion Tinney and

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Olsen reported the diagnosis could not be made in 38%.[3] In other series 39%,[4] 17%[6] and 1%[7] of cases were not diagnosed.

These undiagnosed cases occur most frequently in about the second or third decades although they may occur in older age groups.[11, 12, 19] Skaggs and Smiley[12] studied 50 cases and found homolateral chest pain in 44, cough and weight loss in 33, anorexia in 21 and night sweats in 18. It should be noted that this early peak incidence and these signs and symptoms are, although nonspecific, typical of tuberculosis. Furthermore, it was pointed out previously that tubercle bacilli are very difficult to culture from effusions which are due to tuberculosis. Falk[19] cited four previous authors' series which showed 30% of 435 cases of idiopathic pleural effusion developed pulmonary tuberculosis within five years. Roper and Waring[24] studied 141 adult white males with idiopathic pleural effusions and positive tuberculin tests. Within five years 65.2% of these men developed some form of active tuberculosis! In Skaggs and Smiley's[12] study of 50 patients 16% developed tuberculosis within six years. Tuberculin skin tests were positive in the 38 patients so tested. Incidentally, seven of the eight patients with tuberculosis had an extrapulmonary form.

The failure to develop clinical tuberculosis immediately after an "idiopathic" effusion should not cause one to assume that all is well. In one of the previously mentioned series[24] tuberculosis did not make its appearance in less than nine months after the effusion and the average time was 19.4 months! In the other series[12] tuberculosis appeared from six months to six years later.

The general statement that, *"Idiopathic pleural effusion in the tuberculin positive individual should be considered as being due to tuberculosis and treated accordingly"* has received strong support and should be axiomatic.[10, 11, 12, 17, 19, 20, 25, 26] It would be well worthwhile to discard the term "idiopathic pleural effusion" in *tuberculin positive* patients and substitute "pleural effusion, presumably tuberculous."[1] The presence of a positive tuberculin skin test is all-important since the pathogenesis of this type of effusion requires hypersensitivity to tuberculin! It is also important to do all procedures which reasonably might furnish the key to the correct diagnosis. Mandel et al,[27] offer a "checklist" for use in attempting to diagnose cases of pleural effusion.

X-ray Examinations

Adequate x-ray examination is often of great value in showing that a pleural effusion is present as well as sometimes being of aid in determining its cause. It may also be used as an aid in determining the site for thoracentesis.

It has long been realized that relatively small amounts of fluid in the chest are not readily demonstrable by physical examination. It is somewhat surprising to learn that large amounts are also necessary in order to be seen by the usual radiographic procedures. Kaunitz[28] was unable to see fluid at the costophrenic angles even after injecting 300 ccs. of normal saline solution. Markovits[29] states that about this same volume of fluid must be present to be visible "in the upright position." Barry[30] considered it a "well established fact that routine roentgenograms may fail to reveal as much as 500 ml. of pleural fluid." Wilson[31] found volumes exceeding 1000 cc. failing to produce "any of the accepted roentgen features of pleural effusion."

As will be seen, the radiographic appearance of pleural effusions may vary greatly. However, the appearance of fluid on a PA view is usually seen at first as an obliteration of the costophrenic angle(s) by a slight haze and this may cause the diaphragm to appear flattened. Careful scrutiny may reveal a thin wedge of increased density along the lateral chest wall just superior to this haze. As the amount of fluid increases an upward concave, indistinct line, higher laterally than medially will be seen. On the lateral view it appears higher posteriorly than anteriorly. The height of the curved line is roughly proportional to the volume of fluid and, when massive, only the medial portion of the apex may be aerated. Rarely, the entire hemithorax will appear opaque. Also as the volume of fluid increases the mediastinum will be shifted to the opposite side unless it is "fixed."

This characteristic x-ray configuration of pleural fluid is, for the most part, determined by two factors: gravity and the in-

herent retractility of the lung. (Capillarity and the nature of the fluid are minor factors.) The weight of the fluid causes it to first collect at the lung bases. "The *retractile power* of the lung is directly proportional to the distance from the hilus, the fixed point of the lung."[32] Therefore, the lateral portion of the lung, being furthest from the hilum, is quite retractile and the fluid ascends along the lateral wall in a gradually decreasing manner. Kaunitz[33] recognized three zones which gradually merge with each other in simple pleural effusions. Lowermost is a *radiopaque* zone in which the lung "floats" or is separated completely from the chest wall. The middle zone is *radiotranslucent* and represents a combination of fluid and aerated lung. Above this is a transparent zone too thin to be visualized on the radiograph. Kaunitz proved the presence of the latter zone by removing 10 cc. of fluid and injecting an equal amount of a light radiopaque oil into the pleural space. The oil floated to the top of the pleural fluid at a level which was actually higher anteriorly and/or posteriorly than there appeared to be fluid on a previous film.[28] Actually the upper level of the oil was nearly as high as the highest visible level of the fluid at the lateral chest wall!

In 1931, Rigler[34] discussed the difference of opinion among previous authors as to the freedom of movement of fluid within the pleural cavity. He concluded from his own studies that all transudates and most exudates moved with changes of position of the patient. Therefore, he suggested the use of the lateral decubitus position for determining the presence of small effusions.[35] (He states that at least two authors previously had suggested this procedure.) If the fluid is not encapsulated it will thus descend by force of gravity to the lowermost portion of the pleural cavity. If the involved side is dependent the fluid will be seen to "layer" along the lateral rib cage. If the involved side is uppermost the fluid will appear confluent with the mediastinal structures. Very small amounts of free fluid are demonstrable by this means and therefore a lateral decubitus film, preferably with the involved side down, should be obtained on any patient if there is any question concerning the presence of free pleural fluid.

Atypical Types

Although most cases of pleural effusion will fit the previous description of roentgenographic findings there are *atypical* distributions.

1. *Interlobar.* During almost any effusion of more than a slight amount within a free pleural space the fluid will, at some time, invade the interlobar spaces. When viewed roentgenographically in the plane parallel to the fissure this will cause increased density of a somewhat wedge or band-like configuration. When viewed perpendicular to the fissure the density will not be as great but over a larger area and of a more circular or spindle-like configuration.

2. *Flat upper margin.* When air, as well as fluid, is present in the pleural cavity the upper margin of the fluid is a straight, horizontal line—the "air-fluid level." However, rarely the lung will have lost enough retractility to cause the upper margin of the fluid to be almost flat although no air is present.

3. *Peripherally loculated.* An effusion may initially be free in the pleural space but, with time, adhesions are formed which "loculate" some of the fluid to one area. This may be a single or multiple occurrence and free fluid may or may not be present also. Sante[36] noted, "Regardless of the location, there is one unvarying characteristic about localized effusions: the sharply outlined rounded margin, with its base at the periphery and the convexity directed inward toward the lung, because of the compressibility of the lung structure." He also advised fluoroscopy to aid in positioning the patient for the x-ray film since at *some* angle the peripherally loculated effusion "comes to the surface" (i.e., appears at the chest wall).

4. *Interlobar loculated.* In 1928, Stewart[37] reported a case in which four episodes of congestive heart failure were accompanied by the appearance of a shadow on the roentgenogram, apparently in the transverse fissure, and disappearing with clearing of the congestive failure. Within a short while another similar case was reported and, except for Stewart's case, it was stated, "A rather careful survey of the literature reveals that the condition either is extremely rare or has not been reported."[38] Since

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then many cases have been reported with the features of: an interlobar loculated effusion; congestive heart failure; and clearance of the effusion with disappearance of the congestive heart failure. Because such an interlobar loculated effusion may have the appearance of a tumor it has been called a "vanishing tumor"[39] or "phantom tumor."[40] Indeed, the importance of this condition is that is is frequently thought to be a lung tumor. The incidence is rather rare since only 36 cases in the literature were found by 1955 and five more cases had been found at the Mayo Clinic in the previous nine years.[41] Another study revealed this condition in 0.22% of medical admissions.[42]

The mode of development of an interlobar loculated effusion may be by means of extension of a free pleural effusion into a fissure after which adhesions are formed "trapping" a portion of it there.[43] Gefter et al,[39] considered obliterative pleuritis as a prerequisite. Weiss et al,[42] found that "all cases (autopsied) have shown obliterative pleuritis of part or all of the pleural cavity." Two reports of interlobar loculated effusions during one bout of congestive heart failure but with generalized pleural effusions in later bouts is contrary to the generally accepted concept of mode of formation.[40, 44] Higgins et al,[41] found obliterative pleuritis often, but not invariably present. They found the predominant symptoms to be of left ventricular failure although right ventricular failure is usually associated with pleural effusion. They believed the interlobar pleura to be drained by pulmonary veins and the rest of the pleural space by systemic veins. Therefore, they concluded drainage of interlobar pleura by pulmonary veins would be more impaired by left ventricular failure than drainage of parietal pleura by systemic veins.

The latter authors noted the location of "vanishing tumors" in 41 cases to be: right transverse fissure in 26 cases; right transverse and right oblique in six cases; right oblique fissure only in four cases; left oblique fissue in three cases and the azygous fissure in two cases. DiMaio[45] has reported a case of congestive heart failure with transient loculated fluid in the superior mediastinal region and right axillary region as well as the transverse fissure.

The condition of "vanishing tumor" of the lung may readily be recognized on the roentgenogram if several things are kept in mind:

1. Some evidence of congestive heart failure such as an enlarged heart and/or pulmonary vascular engorgement is almost invariably present.
2. The density in question is in the region of an interlobar fissure, is homogeneous, and without lobulated edges as may be seen with neoplasms.
3. On the lateral view, if not on the PA view, there is usually some tendency to assume a spindle-like configuration.

Much attention has been given to "vanishing tumors" due to congestive heart failure but it should not be forgotten that pneumonia, and other conditions, can give rise to interlobar loculated effusions.

5. *Mediastinal.* Fluid may be localized, at least in part, in the paramediastinal regions. Katz and Reed[46] stated that in their experience this was the most common place for accumulation of an "atypical" pleural effusion. Freedman[47] described both anterior (to the pulmonary ligament) and posterior mediastinal effusions. *Anterior* mediastinal effusions are "represented by ribbon shaped shadows, parallel to either the left or the right cardiac silhouette, and producing a double cardiac contour on the diseased side." "The *posterior* mediastinal effusions produce either ribbon-shaped shadows running parallel to the left or right borders of the vertebral columns, or triangular shadows in the cardiophrenic angles. The base of these shadows is upon the diaphragm and their apices are directed toward the hilum." Storey[48] reported two cases in which encapsulated paramediastinal effusions simulated mediastinal tumors.

6. *Infrapulmonary.* As much as 1000 cc. of fluid may collect between the inferior surface of the lung and the superior surface of the diaphragm without causing any haziness or obliteration of the costophrenic angle.[31] The PA chest film of such an accumulation of fluid suggests an elevated diaphragm. Fluid from any cause may produce this phenomenon but blood has a "particular propensity" to do so. Although infrapulmonary pleural effusions are not well known they are not rare. Wilson[31] was able to find only 62 cases in a review of the lit-

erature in 1955 but found 24 cases in one hospital in an eight month period. Barry[30] found seven cases during the same time period that he observed 45 patients with "unmistakable signs of pleural effusion."

The localization of pleural fluid in the infrapulmonary region is probably due to "drawing" it into this region from the costophrenic angles due to capillary attraction[49] and a more "negative" pressure over the dome of the diaphragm during inspiration.[31] Actually, most pleural effusions may be infrapulmonary early but "spill over" into the costophrenic angles when larger volumes are formed.[46] Some authors believe that pleural adhesions are of importance in causing the infrapulmonary localization.[50, 51]

The diagnosis of infrapulmonary pleural effusion should be entertained in any case in which there appears to be an elevated diaphragm on the roentgenogram. This is particularly true when, if it occurs on the left, a wide area of opacity exists between the upper edge of the stomach bubble and the lowest portion of visualized lung.[30, 31, 50, 51] If the stomach bubble is not readily seen it can be made more prominent by the ingestion of a carbonated drink[50] or sodium bicarbonate.[51] Pneumoperitoneum may be used to outline the lower border of the diaphragm and is particularly useful when the infrapulmonary effusion is on the right.[50, 51] However, simpler roentgenological techniques are available. The lateral decubitus position will allow the infrapulmonary fluid to drain out and, with the involved side dependent, flow along the lateral chest wall.[30, 35, 50] Also, forced expiration in the upright position may displace the fluid so that a typical curved line of pleural effusion occurs.[52] On the usual lateral view a small amount of fluid is often seen extending in wedge-like fashion into a fissure.[31]

Examination of Pleural Fluid

There are two diagnostic aspects of pleural effusion: (1) the diagnosis of the *presence* of the effusion; (2) the diagnosis of the *cause* of the effusion. The first aspect depends mostly upon physical and radiographic examinations. The second aspect also depends upon physical and radiographic examinations but clinical history and examination of the fluid itself may be very helpful.

Examination of pleural fluid, as in any laboratory study, does not always lead to a diagnosis, and upon occasion, may even be misleading. However, when the diagnosis is not known from previously obtained data then fluid should be obtained without hesitation and those tests performed which, according to all information at hand, are most likely to aid in obtaining the correct diagnosis. The information gained from any single test is rarely diagnostic in itself but should be dealt with as another item to be considered in the differential diagnosis.

Each type of examination of pleural effusion will be discussed separately.

1. *Appearance.* Transudates will usually have a very clear, only slightly straw appearance. With the addition of more cellular elements, it becomes cloudier until finally, as an empyemic fluid, it is opaque, pus-like and viscid. An effusion with a high cholesterol content has a "characteristic satin-like sheen"[53] and the chyle from chylothorax has an appearance like milk or cream.

2. *Specific Gravity.* The measurement of the specific gravity is a simple procedure and has long been used as an aid in differentiating transudates from exudates. Usually, a specific gravity of less than 1.016 is considered characteristic of a transudate and above 1.016 characteristic of an exudate. However, in actual practice it will be found that the pleural fluid in a given condition is an exudate but occasionally will be found to be a transudate, or vice versa. Paddock[54] found that 90% of pleural effusions due to congestive heart failure had a specific gravity of 1.016 or less and 90% of tuberculous fluids to be 1.016 or more. Also, 31% of non-tuberculous infections had a specific gravity of 1.016 or less and nephrotic fluids were "uniformly" low. Myerson[7] generally agreed in that, "The specific gravity of pleural effusions of those patients with congestive heart failure averaged 1.010, while pleural effusions due to infections and neoplasm had an average specific gravity of 1.021." Goldman[55] stated, "All tuberculous fluids have a high specific gravity above 1.020 and coagulate rapidly." Also, it should be remembered that the specific gravity of cholesterol thorax fluid is usually high—a reading of 1.032 having been reported.[53]

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Two sources of error may be encountered in using the specific gravity for diagnostic purposes. (1) The determination should be carried out with the temperature of the fluid being the same as that at which the hydrometer was calibrated. An error of as much as .010 may thus be avoided.[51] (2) A transudate of long standing may give a high specific gravity.[56]

3. *Protein.* Determination of protein content of pleural effusions has also been used in attempting to differentiate transudates from exudates. Three grams protein in 100 cc. fluid is usually used as the arbitrary dividing point. Although some authors consider the measurement of protein to be superior[6, 7, 57] others consider it to be no better than the determination of the specific gravity.[54, 58]

From several studies of protein content of pleural effusions[7, 54, 57, 59] the following conclusions may be drawn. Tuberculous fluid almost always has a high (greater than 3 gms. %) protein content. Pneumonia and malignancy fluids will usually have a content of greater than 3 gms. % but very infrequently it is less. The fluid of congestive heart failure is low in protein most of the time. Cirrhosis, and more particularly nephrosis, almost always have fluids of very low protein content.

Although the protein content of the fluid is only "circumstantial evidence" it may be of value in that it may lead to the diagnosis of tuberculosis or malignancy in a patient who also has congestive heart failure, etc.[59]

Electrophoretic patterns of pleural fluid proteins have failed to be of diagnostic value.[57, 60]

4. *Cell Counts.* Total leukocyte and differential counts may add to "circumstantial" diagnostic evidence although several authors have found them to be practically worthless or of little value.[6, 7, 8, 58]

Generally, exudates will have over 500 leukocytes per cubic millimeter with 80% or more of these being polymorphonuclear[17, 56] Paddock[54] found more than 1000 leukocytes/mm.^{3} in 85% of pulmonary infections, 73% of tuberculosis, 42% of neoplasms, 27% of cirrhosis and 10% of cardiac cases. Although there are exceptions, tuberculous effusions have a preponderance of lymphocytes.[17, 48, 56, 61]

Robertson[62] found eight out of 253 cases of pleural effusions in which eosinophils constituted over 50% of the fluid leukocytes. (No other case had more than 1% eosinophils.) He was impressed that three of these cases were due to pulmonary infarcts. From this study and a review of the literature he believed tuberculosis or malignancy to be unlikely in the presence of pleural eosinophilia. Goldman[55] states high eosinophil counts may be present in many conditions. In a study of 146 "serous" pleural fluids Robertson[8] also found that more than 50% polymorphonuclear leukocytes did not occur in "neoplasm, transudate of infarct."

From 5,000 to 6,000 red blood cells/mm.^{3} are necessary to give a red tint to a pleural effusion.[3, 63] However, a fluid may be "hemorrhagic" because of leakage of a small amount of blood into it during thoracentesis. Leakage of as little as 2 cc. of blood into 1,000 cc. of fluid could give a count of 10,000 red blood cells/mm.^{3}[3, 54] At least six authors have found hemorrhagic pleural effusions to be due to malignancies in ⅔ to ¾ of cases.[5, 6, 7, 54, 61, 63] Tinney and Olsen[3] found the underlying cause of hemorrhagic effusions to be malignancy in 85% of cases and state, "This fact is of clinical significance because if congestive failure can be eliminated as a cause of bloody effusion in a specific case there is a 95% chance that a malignant process—is present." After malignancies the more common causes of hemorrhagic effusions include congestive heart failure, pulmonary infections and infarctions, trauma and cirrhosis—in approximate order of decreasing frequency. It is to be noted that tuberculosis is *not* a frequent cause of bloody effusion.[61, 63] A count in excess of 100,000 red blood cells/mm.^{3} is rare in nontraumatic cases except in neoplastic fluids where it was found to occur in 12%.[54] Only 1% of cardiac effusions had such a count.

5. *Cytology.* The presence of malignant cells in the pleural fluid presupposes that involvement of the *pleura* by the malignancy must have taken place. Regrettably, this almost invariably indicates an incurable case. It is possible for a pulmonary malignancy to be present and causing bronchial obstruction. Infection distal to the obstruction may

then cause a pleural effusion but no malignant cells would be found in the fluid.

Unfortunately, cytological examination frequently fails to yield the diagnosis. Berliner[63] found tumor cells in 50% of 70 cases of hemorrhagic neoplastic fluids examined. Graham et al,[64] also found carcinoma cells "in about 50% of 226 cases of pleural effusion due to malignant tumors." Leuallen and Carr[6] found malignant cells in the fluid in 59% of carcinoma of the bronchus, 54% of carcinoma of the breast and 13% of lymphoma and leukemia cases. Tinney and Olsen[3] found malignant cells in 30% of cases of carcinoma whereas in Robertson's[8] series of malignant effusions only 24% could be "diagnosed with absolute certainty by cytological examination." Phillips and McDonald[58] were able to make a "positive diagnosis" by cytology in 38% of malignancy-proven cases of pleural effusions. Examination of multiple specimens will increase the possibility of finding diagnostic cells in malignant cases.[6, 64, 65]

Fortunately, "false positive" findings occur in only about 1% of examinations.[58, 64, 65] The most common cause of a false positive is pulmonary infarction but cardiac failure is also a relatively frequent cause.[8]

6. *Cultures.* Culture studies of pleural fluid will depend primarily upon the preceding clinical course as to what type of media is to be used and even if cultures are necessary at all. Blood agar is used for the more common pathogens, any of a number of media when tuberculosis is suspected, Sabouraud's and dextrose blood agar for fungi and anaerobic media when the rare case of Actinomycosis is suspected. Prevention of contamination of the specimen is, of course, imperative.

Many authors have stressed the importance of using adequate amounts of fluid when attempting to culture the tubercle bacillus. "Large amounts,"[18] 300 cc.,[67] 500 cc.,[19] and using the centrifuged sediment of "all"[10] the fluid have been suggested. Robertson[8] found that 10 cc. of fluid will result in positive culture of tubercle bacilli in 16% of cases of tuberculous pleural effusions whereas 100 cc. will give 52% positive cultures.

7. *Glucose.* Calnan et al,[66] studied the glucose content in 61 cases of pleural effusion and also summarized the findings of four previous, similar studies. They found only tuberculosis to cause less than 60 mg./100 ml. glucose content and most non-tuberculous effusions to have more than 100 mg./100 ml. They could attach "no significance" to intermediate levels. Deakins et al,[28] later reviewed the literature and studied the glucose in pleural effusions in 100 cases in which the diagnosis was made. They concluded that a glucose content of 26 mg./100 ml. or less was "highly suggestive" of tuberculosis and one of 80 mg./100 ml. or higher should make one suspicious of non-tuberculous causes. Peterson[68] had previously found somewhat similar results except that two of his three patients with pneumonia had less than 26 mg./100 ml. of glucose.

8. *Cholesterol.* Goldman and Burford[53] stated there were some 60 cases in the literature of pleural effusions of high cholesterol content and added three patients who were cured by decortication. Later Frew and Campbell-Fowler[69] added two more cases. They believed the etiology to not be related to a disorder of cholesterol metabolism but noted the "concentration of cholesterol is most probable in pathological fluid of considerable maturity, provided that it is sufficiently isolated from circulating body fluids—such conditions being met with in the case of old-standing effusion in a thick-walled space." Because of the chronicity, tuberculosis is usually, but not invariably, the cause. The cholesterol level may be very high (2165 mg./100 ml. in one of Goldman and Burford's[53] cases) and is always higher than a simultaneous fasting blood level.

9. *Amylase.* Pleural effusion may occur, particularly on the left, in association with pancreatitis and be noteworthy due to its high amylase content. Kalser et al,[70] described a case of relapsing pancreatitis with a pseudocyst of the pancreas and amylase and lipase in increasing order of concentration in the serum, pleural effusion and pseudocyst. They postulated that the enzymes reached the effusion by way of the lymphatics.

To be concluded in the September issue of *The Journal.*

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WHAT ARE WE DOING FOR OUR STROKE PATIENTS?

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TODAY IN OKLAHOMA, as elsewhere, the disability commonly called "stroke" is being seen in ever-increasing numbers by practically all physicians-general practitioners and specialists alike. What are we doing for these patients? Is the physical residue of this condition impossible of treatment?

In the past, our medical attitude has been rather negative. The catastrophic intrusion of a "cerebro-vascular accident" (C.V.A.) upon an individual's functional and vocational capacities can be considered a tragedy of primary magnitude. From all sides, he finds rejection, latent and otherwise. As time passes, personal frustrations mount, and intolerance becomes displayed by the immediate family. Soon, society tends to look upon the hemiplegic as an outcast—to be tolerated, but not endured; to be sustained for basic needs, but not employed. To a lesser extent he also is denied recreational opportunities. These attitudes tend to incubate a mire of depression and loneliness for a man who is not a man.

There never has been a question of medicine not accepting the validity of the objectives for rehabilitation. Society, too, assumes that these services are inalienable rights. Nevertheless despite such unanimity of mutual interest, it is an admitted fact that such restorative medical care is expensive in terms of money, personnel and facilities. The "stroke" patient is not alone in this area of consideration. He assumes top interest because experience has proved beyond a shadow of a doubt that he can be retrained to live "within the limits of his disabilities" and "to the hilt of his capacities."

The answers to these questions are significant not only to the special area of physical medicine and rehabilitation, but to medicine as a whole. The purpose of this paper is to illustrate what the physician and community can do to surmount the obstacles encountered in a management program.

In a recent review of 25 consecutive "stroke" cases (Table I) between 1955 and 1959 in the University Hospitals Clinic and in private practice, there were 15 "private" and 10 "clinic" patients.

Of these 25 patients, eight or 32% were female and 17 or 68% were male. Their ages ranged from 11 years to 72 years. By disability, 14 or 56% were right hemiplegics, and 11 or 44% were left hemiplegics. All but one of the right hemiplegics had varying degrees of dysphasia. By etiology, the majority were due to cerebral hem-

	Patient	Age	Sex	Diasbility	Etiology	Therapeutic Goal
1)	J. F.	53	M	Right hemiplegia Aphasia	Astrocytoma	Ambulation—died
2)	B. W.	61	F	Right hemiplegia Aphasia	Cerebral hemorrhage	Ambulation, self-care
3)	F. L.	70	M	Left hemiplegia Mental confusion	Cerebral thrombosis	Ambulation, partial self-care
4)	E. E.	66	F	Right hemiplegia Aphasia	Cerebral hemorrhage	Ambulation, intelligible speech
5)	G. M.	49	M	Right hemiplegia Aphasia	Cerebral hemorrhage	Ambulation, self-care
6)	L. K.	52	F	Left hemiplegia	Cerebral embolism	Ambulation, finger function, self-care
7)	M. S.	7	M	Left hemiplegia	Cerebral hemorrhage	Ambulation, self-care
8)	B. D.	64	M	Right hemiplegia Aphasia, Incontinence	Cerebral thrombosis	Ambulation, partial self-care, continence
9)	J. W.	63	M	Left hemiplegia	Cerebral thrombosis	Ambulation
10)	D. B.	15	M	Left hemiplegia	Empyema, Brain Abscess	Self-care
11)	W. W.	61	M	Right hemiplegia	Cerebral thrombosis	Ambulation, partial self-care
12)	H. H.	56	M	Left hemiplegia	Cerebral thrombosis Diabetes mellitus	Ambulation, self-care, finger function
13)	G. G.	59	M	Left hemiplegia	Cerebral hemorrhage	Ambulation, self-care
14)	F. C.	72	M	Left hemiplegia	Cerebral thrombosis	Ambulation, self-care
15)	J. D.	64	M	Left hemiplegia	Cerebral thrombosis	Ambulation, self-care
16)	P. M.	40	F	Left hemiplegia	Mycotic embolism	Ambulation, self-care
17)	J. P.	34	F	Left hemiplegia	Postpartum— Cerebral embolism	Ambulation, self-care
18)	F. C.	63	M	Right hemiplegia Aphasia	Cerebral thrombosis	Ambulation, partial self-care
19)	W. T.	42	M	Right hemiplegia	Cerebral hemorrhage	Ambulation, speech, self-care, employment
20)	H. B.	59	M	Right hemiplegia Aphasia	Cerebral thrombosis	Ambulation, speech
21)	L. H.	18	F	Right hemiplegia Aphasia	Cerebral hemorrhage (Traumatic)	Ambulation, speech, vocational rehabilitation
22)	L. T.	11	F	Right hemiplegia Aphasia	Cerebral hemorrhage (Traumatic)	Ambulation, self-care, speech, school
23)	J. M.	64	M	Right hemiplegia Aphasia	Cerebral thrombosis	Ambulation, self-care, died
24)	F. L.	66	F	Right hemiplegia	Cerebral hemorrhage	Ambulation, self-care
25)	W. B.	58	M	Right hemiplegia Aphasia	Cerebral thrombosis	Ambulation, self-care

TABLE I

orrhage or thrombosis. Tumor, abscess, and head injuries accounted for the remainder. Two or 8% of these patients succumbed during the rehabilitation period.

In assessing the results of rehabilitation for this group, it must be kept in mind that they represent severe types and degrees of disabilities. Neither must one assume that the ratios presented are specific although they do fall within national averages. On the whole, age, sex, and disability distributions are about equal, but the therapeutic goals are consistent with other similar studies. It may be generally stated that medical rehabilitation is possible in more than 90% of hemiplegics. On the other hand, few "strokes" realize satisfactory vocational goals principally because employers will not hire such handicapped. In the second place even if hired, is any attempt made for selective placement consistent with residual vocational capacities of the individual. Consequently, in terms of occupational goals, rehabilitation cannot be considered complete unless the "stroke" is returned to a job or at least to a socio-recreational status.

Following a comprehensive physical medicine and rehabilitation program, 23 or 92% were capable of ambulatory activities; 19 or 76% were able to carry out self-care, and four or 17% could do partial self-care.

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Rarely, does one find a hemiplegic who cannot achieve some benefit from rehabilitation. In these cases, there is usually a mental degeneration or other complication to mitigate against successful treatment.

Discussion

Those concerned with rehabilitation believe the care of these patients lies within the province of the general practitioner. He often is the first to see the patient and can readily initiate the proper treatment before complications develop. Deformities and contractures, in addition to mental depression often result when treatment is delayed unduly. What does one do with such a patient?

When confronted with a case of recent hemiplegia, the rehabilitation treatment is multiphasic:

1. Bed - nursing care.
2. Ambulation.
3. Self-care activities. (A.D.L.)
4. Speech Therapy.
5. Vocational Rehabilitation.
6. Recreational.
7. Custodial.

1. Bed - nursing care.

In general, treatment is begun early—the earlier the better. Where there is cerebral hemorrhage, many wait until the spinal fluid is negative for frank blood.

Bed care is confined to passive mobilization of the joints to prevent contractures from developing early. The shoulder, elbow, wrist, and fingers are often affected. A simple means of preventing a "frozen shoulder" or impaired shoulder joint range is a pillow in the axilla. At the wrist a splint is often required for supporting the paralyzed wrist and fingers in dorsiflexion —the optimal position of function. Later, a more functional type of bracing may become necessary. (Figure 1)

In the lower limb, "dropped foot" with external rotation develops early and if ambulation is encouraged, the many problems associated with peripheral paralysis is reduced considerably. A sandbag lateral to the hip joint with a functioning footboard or brace maintains correct alignment and prevents heel cord shortening. However, in many cases, these are only partially effective because as the patient moves these

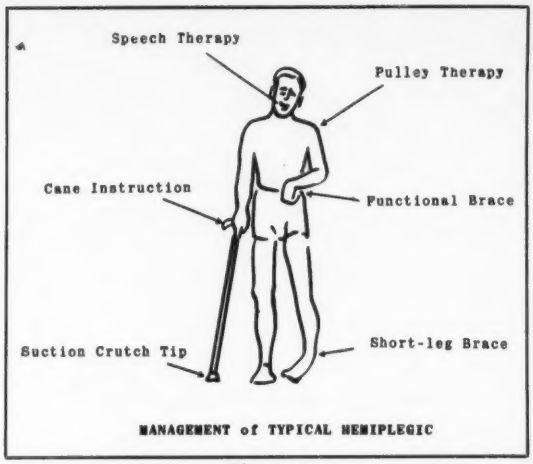

Figure 1

supports fall away. Of more importance is the placement of a knotted rope to the foot of the bed or an overhead "horizontal bar" to encourage and assist in the sitting position using the good limb.

From the upright position in bed, the patient is taught to shift off the bed and transfer to a wheelchair. Bladder, bowel, and decubiti complications become less of a problem when the sitting position is achieved. To encourage these ends, a low bed, e.g., "Vari-Hite" (Simmons) can prove of immeasurable value in the development of independence and freedom from nursing assistance.

2. Ambulation.

Most "stroke" patients can flex and extend the hip and knee. When these are flexed at push-off, as in walking, the sole of the foot tends to invert and the ankle supinates. As a result, the patient, in trying to walk, often falls. To prevent this movement of the foot, he substitutes his gait mechanism, and consequently falls into the simpler pattern of walking with hip and knee joints extended or "stiff-legged." In addition, in order to prevent the toe from catching on the floor, rug, etc., he circumducts the lower limb, producing the typical hemiplegic-type gait. If this circumducted gait is used for any period of time, the pattern set up becomes difficult to correct.

To restore the normal gait pattern when the pyramidal tract is involved and also to create confidence, a short-leg brace is usually prescribed. This brace is of the double-bar surgical steel variety, with stirrup at-

tachment, and 90 degree stop at the ankle. In some cases, to minimize the tendency for supination of the foot, a T-strap is added for stability. Finally, and most important, correct instruction and training is necessary if the patient is to learn to walk. Ambulation can be achieved in the majority of cases, particularly when the rehabilitation program is prescribed and followed by the physician in charge.

Many patients, especially the younger group, do not require an assistive aid in learning to walk. However, the aged individual may require a cane to promote balance and confidence, for no "stroke" case should be deprived of the opportunity to walk again.

In using the cane, a correctly adjusted length is necessary as well as instruction in its use. A suction crutch tip is essential to prevent accidents and not the commonly employed hard rubber tip which slips on smooth surfaces.

3. Self-care Activities (A.D.L.)

Since use of the digits is considered to be one of the highest achievements of man, coming later in the developmental scale, loss of this function often occurs early in the course. Conversely, when finger paralysis is present, the last function to be restored—if the damage is not too severe, is the ability to oppose the fingers. Many patients are most concerned with this upper limb disability. Consequently, they should be informed that recovery is best attained when ambulatory activities are primary and hand treatment secondary, never the reverse. It has been found that many patients have poor hand recovery anyway. The psychological repercussions, too, are many if a patient is told he will never have hand function again. This frequently defeats the comprehensive rehabilitation efforts being made, and is to be avoided at all costs.

Since the prognosis for upper extremity function is "fair" to "poor," in general, it is preferable to instruct the patient to use his unaffected limb to its best advantage. This is essential in developing the ability to care for all the inherent activities in daily living (A.D.L.), for example, eating, washing, toileting, etc., using unilateral prehension. A left hemiplegic does not have too great a problem in learning to do bimanual tasks with the right hand if this had been the dominant limb previously. However, this can become a severe problem in a right hemiplegic. The urgency of instituting early training of the left hand becomes readily apparent. At first, simple activities are begun such as eating, dressing, and undressing. Later, more difficult tasks are practiced, such as left-handed writing. Since these individuals also have a concommitant motor aphasia, this becomes an important method of communication.

In practically all patients, unless mobilization therapy is begun early, pain very quickly develops in the paralyzed shoulder muscles. This is frequently due to fibrin deposits within the dependent synovial capsule of the shoulder joint. There is a natural tendency to adduct such a joint and to maintain this position especially with persistent pain. The end result of this immobility is a "frozen shoulder" with reflex dystrophic changes in the entire limb and hand.

A simple but exceedingly effective treatment is what is known as "pulley therapy." This consists of a pulley and a short length of clothesline rope. The paralyzed hand is well padded and tied to one end. The pulley is then hooked to a ceiling joist or overhead door board and the good hand pulls the opposite rope end. This maneuver permits the shoulder joint to be mobilized passively and within the patient's toleration of pain. At the same time, the unaffected limb is also strengthened.

4. Speech Therapy.

Aphasia in hemiplegics occurs usually when the dominant hand is affected. There may be either a motor or sensory aphasia—frequently both are present. The added speech frustration to paralysis often is overwhelming and patients become highly emotional when communication is attempted. Evaluation and appropriate treatment is best instituted by one specially trained in this work as a speech pathologist or therapist. Comprehensive rehabilitation of the "stroke" patient includes a proper schedule of speech therapy together with other treatment—never alone. Restoration of hand, speech, and comprehension requires guidance by representatives of several disciplines: physical and occupational therapy, speech therapy, and psychology.

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Skill in oral communication is often necessary for social and economic rehabilitation. It has been said that the premorbid level of oral as well as written communication is rarely attained in hemiplegics. Consequently, the family must be made to realize at an early date that maximum recovery is very variable. To continue receiving outpatient language therapy after a reasonable period is unjustifiable. On the other hand, if speech therapy services are unavailable because of remoteness to facilities, these should not be denied as they become available.

In general the "stroke" patient should receive speech therapy as soon as feasible, otherwise the depressive effects of the disability can destroy motivation for other areas of therapy.

5. Vocational Rehabilitation.

There is enough information available to indicate the social and economic benefits of rehabilitation. The hemiplegic often requires an insight into accepting himself as a handicapped person if he is to utilize most effectively the vocational residual resources he possesses. Work satisfies basic needs and relates directly to the self concept of a well integrated personality. Dissatisfaction in the work area usually leads to inadequacy in other areas.

At the present time, employment for the "stroke" case leaves much to be desired especially when speech is involved. Many have accepted self-care goals as being the ultimate in rehabilitation. Sheltered workshops such as Goodwill Industries offer much in encouraging return to productivity. Industry yet has to contribute in this direction. A Ford personnel individual once remarked: "If a job can be done with one arm, why shouldn't an employer hire a man with one arm to do it?"

The Oklahoma Division of Vocational Rehabilitation (D.V.R.) is the state agency most often utilized as a community resource. This agency, if the criteria of eligibility are met, provides not only for service but also for vocational training and transitional placement for the handicapped.

For those who cannot work in the competitive labor market, the sheltered workshop can also provide a terminal or long range work environment with a fair degree of success.

6. Recreational.

As with a normal person, the "stroke" patient requires recreational pursuits for sound mental health. By such participation in diversional activities, he evidences dignity and independence. In this way he strives for a closer attachment to himself, his family, and community. Frustrations due to being withdrawn from the stream of life and lack of a job may be overcome in part by new outlets, and new found freedoms.

Programs for the hemiplegic are to be encouraged such as the Golden-Age Clubs or the Shuffleboard Clubs, as in southern Florida. In Oklahoma City, the Aphasia Foundation, a non-profit organization, meets twice monthly where hemiplegics particularly those with speech impairments can get together. Sing-songs, games, lectures of interest are held to encourage group participation. Recreational centers are also sorely needed where such individuals may be left in safety while the opposite member is out to work.

7. Custodial.

There will always be the "hard core" group of hemiplegics who cannot be taken care of by the family. In these cases, nursing homes with rehabilitation programs can serve to prevent bed-fastness and minimize the cerebral degenerations often seen as a sequelae in the elderly. In Oklahoma, chronic disease institutions for custodial cases are as yet unavailable. Recently, Senior Citizens, Inc., Oklahoma City, a non-profit, multi-sectarian agency is considering the development of a community where such individuals may be cared for by the individual religious denominations. Such group efforts are to be commended and encouraged.

Conclusion

Although hemiplegia presents a challenge to all of us in its complexities and numbers, with today's dynamic approach, using rehabilitation techniques, more than 90% can be restored to a useful life. The 25 cases presented with their achievements in ambulation and self-sufficiency, indicates that it is possible to retrain the "stroke" to a greater degree than previously considered possible.

Pasteur Medical Building, Oklahoma City, Oklahoma

The Use of Extracoporeal Hemodialysis: Artificial Kidney

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This paper is from the Medical Service, Veterans Administration Hospital and the Department of Medicine, University of Oklahoma Medical Center.

History

THE NAME "artificial kidney" was first suggested by Abel, Rowntree, and Turner[1] as early as 1912 when they utilized cylindrical collodion tubing through which blood flowed with the rinsing solution being circulated outside. Haas,[2] Murray, Delorme, and Thomas[3] used the same design but with cellulose tubing. Necheles[4] used so-called "Goldschelegerhaut" (Gold-beater's skin)—the peritoneal membrane of ox intestine—in preparing his dialyzing screen. These early pioneers were hindered by the disadvantage of requiring too large volumes of blood to fill their systems, utilizing too thick walled tubing for adequate dialysis, and employing inadequate or dangerous anticoagulants (hirudin prepared from leech heads was utilized). Although animals survived these early experiments, blood chemistries changed very little, even with prolonged procedures. In 1923, Ganter[5] reviewed the theoretical aspects of dialysis and stated, "I expect that, in one of the ways given above, an 'artificial kidney' can be produced, thereby lengthening life in the patient . . . " with uremia.

The rotating type artificial kidney was described in 1946 by Kolff and Beck,[6] who published detailed plans in 1947.[7] This machine required a small volume of blood (600 ml) for priming and offered a large dialyzing area ($2.4M^2$). A thin column of blood, utilizing the principle of the Archimedes screw, is propelled by gravity through cellulose tubing wrapped around a rotating cyl-

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inder. Dialysis is performed through the semi-permeable cellulose tubing, but, because of inadequate hydrostatic pressure across the membrane, filtration does not occur.

Guarino and Guarino[8] designed a system in which blood was outside the cellulose tubing and rinsing fluid was inside. Efficiency of this machine was low, however, and there was no safeguard against air embolus formation or against over hydration of the patient if a leak in the tubing developed. During twelve in vitro experiments, using old bank blood at Oklahoma City Veterans Administration Hospital, a leak in the system was invariably demonstrated. Control of blood flow and estimation of blood flow were impossible. Skeggs, Leonards, and Heisler[9] "sandwiched" cellophane sheets between grooved rubber plates, and, by forcing blood through the narrow spaces, produced a hydrostatic pressure gradient between the membrane and the rinsing fluid which flowed countercurrent to the blood so that ultrafiltration occurred in addition to dialysis.

A stationary coil of cellulose tubing and wire or plastic mesh wound together into a compact unit offering a large dialyzing area, but requiring a small blood volume was described by von Garrelts[10] and by Engelberg.[11] Kolff and Watschinger[12] further modified this type of hemodialyzer into a relatively cheap, disposable unit that can be mass-produced.* A unit of this type is presently employed at the University of Oklahoma Medical Center.

*Travenol Laboratory

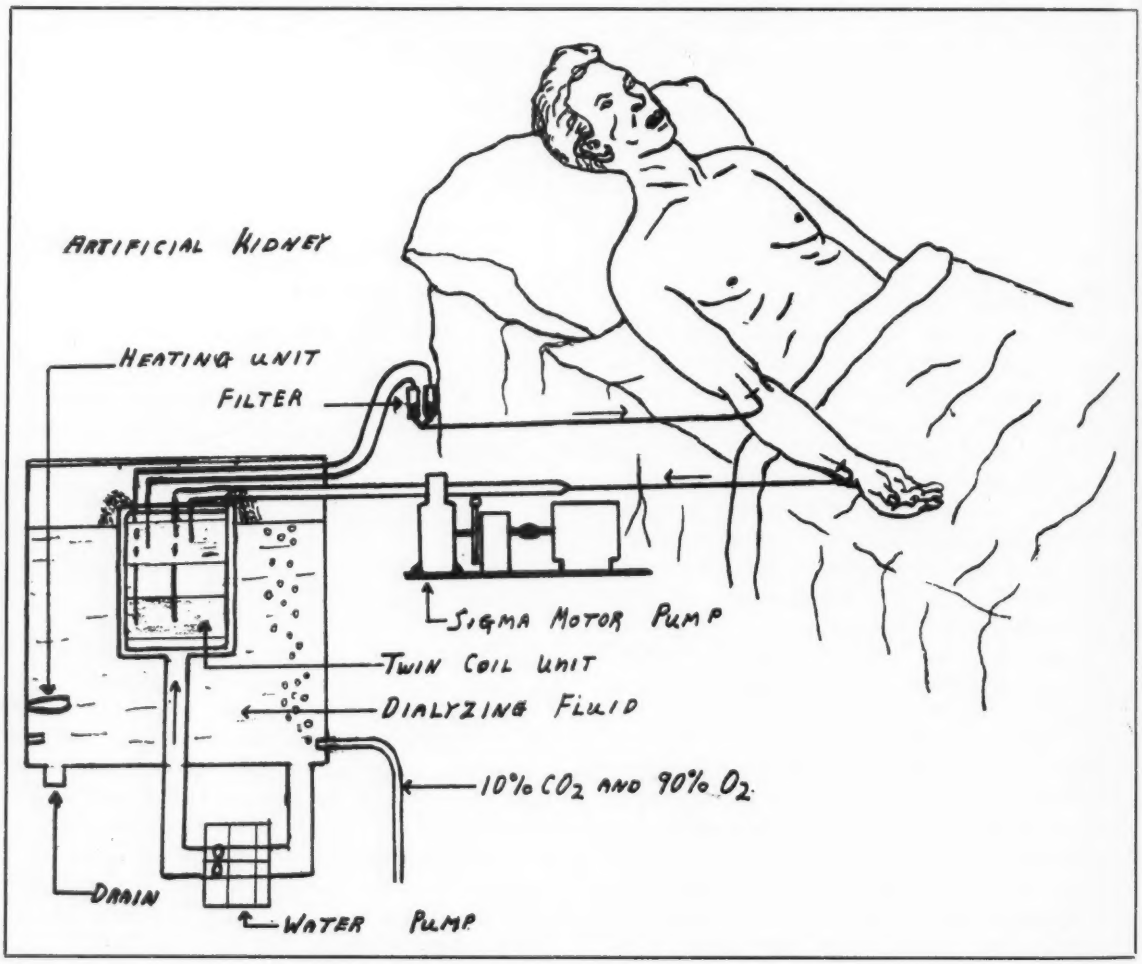

Figure 1. Diagram of Kolff "Twin-Coil" Artificial Kidney

Principle of Hemodialysis With the "Twin Coil" Kidney

Blood is pumped from either a cannulated artery or large vein through a Sigma motor pump** into the coiled cellulose tubing at a rate of 200-300 ml per minute and a pressure of approximately 160 mm. Hg. Sufficient pressure remains on leaving the dialyzing unit to force the flow of blood through a bubble catcher and filter and back to the patient (Figure 1). A large volume of an electrolyte bath solution calculated to correct the patient's electrolytes constantly flows on the other side of the cellophane membrane. Ten per cent carbon dioxide in 90 per cent oxygen is constantly bubbled into the bath solution to maintain a pH near 7.4. Retention products such as uric acid, urea, creatinine, and phenols as well as electrolytes, water, and glucose, are freely diffusible, whereas cellular elements, bacteria, and proteins will not pass through the membrane. A thermostat regulated heater maintains a temperature of 99 degrees F in the rinsing fluid. The rinsing fluid is changed every 90 to 120 minutes to maintain high efficiency. Three-fourths per cent glucose is utilized in the rinsing fluid to supply calories, to balance osmotic effect of plasma proteins and urea, to help in extraction of edema fluid, and to minimize hemolysis. The pressure gradient of about 160 mm. Hg. accounts for filtration as well as dialysis. Approximately 80 mg. of heparin are given to the patient initially; 20 mg. are added to each unit of priming blood (about 700-800 ml.) and 10 mg. are added to the system each hour except the last two hours of the procedure to maintain the clotting time at about twenty minutes.

Indications for Use of the Artificial Kidney

Extracorporeal hemodialysis has been successfully used in the following conditions:

I. Acute renal insufficiency.[13-18]

- A. Following peripheral circulatory collapse, e.g., profound hemorrhage, severe anoxia, acute pancreatitis, trauma, head injuries, severe dehydration, carbon monoxide intoxication, myocardial infarction, septicemia.
- B. Hemoglobinuria and myohemoglobinuria, e.g., crush syndrome, sickle cell crisis, transurethral prostatectomy with hemolysis, incompatible blood transfusions, icterus neonatorum, hemorrhagic fever, severe burns.
- C. Acute obstruction of ureters.
- D. Selected cases of acute glomerulonephritis.
- E. Specific nephrotoxic or nephrosensitive substances, e.g., heavy metals (mercury, bismuth, phosphorus, uranium); antibiotics (bacitracin, viomycin, etc.); Leptospirosis; eclampsia; bacterial toxins; sulfonamides; serum sickness; organic compounds (carbon tetrachloride, black widow spider poisons, mushrooms, etc.).
- F. Hepato-renal syndrome.
- G. Acute renal failure supervening on existing renal disease.

II. Intoxications without direct nephrotoxic actions:

- A. Bromide[19]
- B. Salicylates[20-23]
- C. Barbiturates[24-28] (phenobarbital-pentrobarbital)
- D. Glutethimide[29] (Doriden)

III. Selected cases of intractable edema.[13-30]

IV. Selected cases of chronic uremia.[31]

Selection of Patients

Each patient with renal failure must be individualized. An outline of his management should be established, and the artificial kidney used, if indicated, in conjunction with intelligent medical management, but, certainly, not as a substitute for it. Some patients may have uremic symptoms with a blood urea nitrogen of only 50-60 mg. per cent, whereas, others may be free of apparent symptoms with a blood urea nitrogen of 200 mg. per cent. Therefore, no critical level of urea nitrogen can be established which catagorically requires dialysis. Marked electrocardiographic evidence of hyperkalemia, electrolyte abnormalities,

**Schaar and Company, Chicago, Illinois

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such as K above 7.0 mEq/L, CO_2 combining power below 10-12 mEq/L, and elevations in plasma and red blood cell magnesium, have been helpful in decisions for dialysis, but these chemical abnormalities were, in our experience, accompanied by clinical changes. Our primary indication for dialysis in acute renal failure has been the appearance of clinical nervous system signs and symptoms, such as increased drowsiness, mental confusion, hyperirritability or hostility, convulsive seizures, hyperactive reflexes, and clonus, increased retinal sheen and papilledema, and manifestations of cardiovascular distress, such as pulmonary edema, increased second pulmonic sound, enlarging tender liver, and tachycardia. These changes often occur within the first three to six days of anuria or oliguria, but may occur even in the face of the polyuric phase of acute renal insufficiency. As Salisbury[34] has indicated, incipient diuresis is not a reliable criterion which would argue for delay of hemodialysis when other indications for dialysis exist. It is essential to completely re-evaluate each individual patient considered for dialysis at least two to three times each day.

In the evaluation of patients intoxicated by dialyzable poisons, an accurate history of the patient's having ingested more than the lethal dose of the compound, the presence of coma, or the manifestations of impaired renal function, accompanied by clinical evidence of toxicity are used as criteria for dialysis.

The rationale for extracorporeal hemodialysis in patients with chronic renal disease has been established by Goldner, Gordon, and Danzig.[31] Predisposing factors to a possible prolonged remission are (a) a general symptomatic and chemical "plateau," (b) the absence of severe generalized vascular disease, even though hypertension may be present,[35, 36] (c) the presence of polyuria,[36] (d) the absence of septicemia or infection,[36] and (e) a predialysis serum sodium level of above 130 mEq/L.[36] The consideration of hemodialysis in preparing patients for surgical procedures, especially at those aimed toward improving renal function is especially important. It may also be used following surgery to tide the patient over temporary periods of increased renal insufficiency. Likewise, dialysis may be of value in patients who were known to previously have had fair renal reserve, but show temporary acute excerbations of their primary disease. In our opinion, only a small per cent of patients with chronic renal disease are suitable candidates for hemodialysis. Symptomatic improvement is expected, but whether or not overall prognosis is significantly altered is a moot question. It is hoped that pitfalls of renal homotransplantation will be uncovered in the not too distant future and that this group of patients can be offered more permanent benefit.

Complications and Contraindications

Active bleeding was thought to be an absolute contraindication until the Korean War, when this concept was shown to be often unfounded.[32] It is true that, in the face of uncontrollable gross hemorrhage, e.g. from peptic ulcer, gastric ulcer, esophageal varices, the procedure could be lethal. The requirement of heparin has been greatly decreased by the newer designs of artificial kidneys and the danger of hemorrhage is usually minimal. If such hemorrhage occur, approximately 1 mg. protamine sulfate for each mg. heparin used usually immediately returns the clotting time to normal. Fatal hemorrhage could result if the machine were left unattended and a leak in the system were to occur. Constant supervision is, therefore, essential.

Since the advent of cellulose and polyvinyl chloride tubing, pyrogenic reactions have been virtually eliminated. Fall in blood pressure may occur if there are acute changes in blood volume, but a significant fall can be eliminated by careful operating technique, so that blood volume is kept constant. An elevation in blood pressure is not infrequent and occasionally requires the transient use of anti-hypertensive drugs. Blood pressure usually returns to previous levels within six to twelve hours after dialysis. Transient mild leukopenia and thrombocytopenia may be produced, but seem to be of no clinical significance. The danger of transfusion reaction from the priming blood is minimized by careful typing and Coombs' cross-matching. Urinary output may di-

minish slightly on the day of, and on the day after hemodialysis, probably because of reduction of the osmotic load. Merrill, Legrain, and Hoigne[33] observed no reduction in urine output when they maintained the blood urea at its pre-dialysis level by adding urea to the rinsing fluid.

Heart failure, with pulmonary congestion, might result, if the patient were overloaded with blood, but this is a technical error and can be avoided. Obviously, electrolyte abnormalities could be produced as another technical error. Indeed, correction of electrolyte imbalances and of pulmonary congestion are usually primary objectives in the use of extracorporeal dialysis.

Report of Cases

CASE 1.—A 23 year old white housewife had a history of previous good health until two weeks prior to admission at Oklahoma University Hospital. She had delivered a normal infant approximately six weeks before admission, had had a moderate amount of ankle swelling during pregnancy, but, reportedly, had remained normotensive and without known evidence of kidney disease. Following delivery, she had continuous small amounts of bloody, rather foul-smelling vaginal discharge and suddenly became weak, two weeks before admission. This was followed by decreasing urinary output, so that, for three days before admission, her output was never thought to exceed 20-30 cc. per day. On admission, she had frequent grand mal seizures, increased retinal sheen, and marked mental confusion. Blood pressure was 140 mm. Hg. systolic and 80 mm. diastolic; pulse rate was 120; and temperature, 101 degrees F. There was 2+ pitting pretibial edema and bilateral basilar rales. It was felt that she probably had acute tubular necrosis, secondary to hemorrhage and possible endometritis. On the day after admission, hemodialysis was performed (Table 1). At onset of dialysis, the patient was comatose and convulsing. Two hours after onset, she was alert and fairly well-oriented. After six hours of dialysis, the peripheral edema had diminished markedly and bilateral rales had disappeared. Chemical improvement was dramatic and electrolytes were within normal range. She was able, for the first time, to give a history. On the third hospital day, under light hypnosis and local anesthesia, a dilatation and curettement were performed with removal of small amounts of clots and placental fragments. Urine output remained below 10 ml. per day and she remained mildly febrile. On the fourth hospital day, she continued to deteriorate, became semi-comatose, and again developed grand mal seizures. Dialysis was repeated, following which there was correction of electrolytes to within the normal range, decrease in blood urea nitrogen from 136 mg. per cent to 62 mg. per cent, a loss of 10 pounds of edema fluid, cessation of seizures and marked improvement in orientation. The patient was then able to eat a high caloric, low protein, high fat diet. On both the ninth and fourteenth days of

TABLE 1

Anuric Day	Dialysis No.		Results NA	K	Cl	CO_2	BUN	Weight	Condition
4	1	Predialysis	130	6.0	98	6	156	155	Comatose, Grand mal seizures
		Postdialysis	136	3.7	107	34	100	147	Alert and oriented
8	2	Predialysis	150	6.4	100	15	136	154	Comatose, Grand mal seizures
		Postdialysis	139	4.5	106	25	62	144	Alert and oriented
13	3	Predialysis	154	6.5	100	14	124	148	Lethargic, slightly disoriented
		Postdialysis	142	4.6	101	30	75	142	Alert and oriented
18	4	Predialysis	150	7.0	95	6	150	145	Semi-comatose, Grand mal seizures
		Postdialysis	136	4.3	100	23	71	140	Alert and oriented

Table 1. Results of hemodialysis on Case 1, a 23 year old housewife with necrotizing arteriolitis without hypertension.

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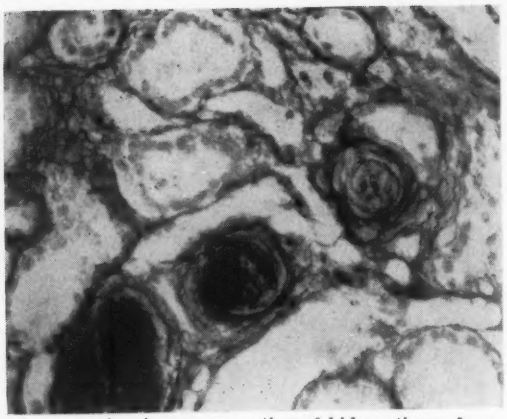

Figure 2-A. Azan preparation of kidney tissue from patient with necrotizing arteriolitis. Note the arteriolar sclerosis and hyaline necrosis of vessel walls.

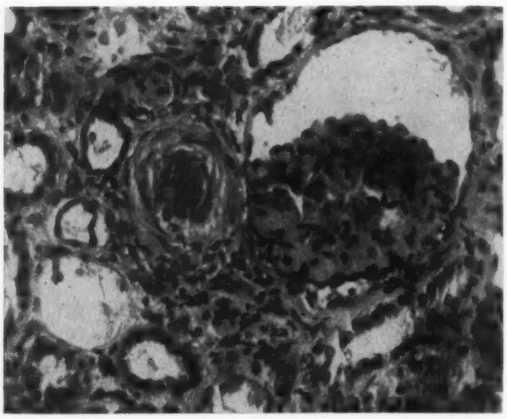

Figure 2-B. H and E preparation of kidney tissue from patient with necrotizing arteriolitis. Note the arteriolar sclerosis. Hyaline necrotic changes have extended to involve glomerular capillaries as well as arterioles and small arteries.

hospitalization, she deteriorated, requiring two further dialyses, with similar gratifying results, including lowering of plasma and red blood cell magnesium to within normal limits and decrease in serum K from 7.4 mEq/L to 4.3 mEq/L. Despite excellent results of hemodialysis and the usual medical regimen for acute renal insufficiency, this patient failed to excrete over 10 ml. urine per day, gradually deteriorated, and died, following a grand mal seizure and hypotensive episode on the twenty-fourth hospital day, prior to the proposed fifth dialysis.

AUTOPSY FINDINGS—The kidneys revealed moderate acute suppurative pyelonephritis and severe necrotizing arteriolitis (Figure 2). She also had evidence of generalized vascular disease, enlarged heart, signs of congestive heart failure, and cerebral edema.

COMMENT.—This intriguing case of a patient with severe necrotizing arteriolitis, in whom there was absence of a history or hospital course of hypertension, illustrates that the artifical kidney is only a temporary measure and can take the place of functioning kidneys but for a limited time.

CASE 2.—A thirty-three year old white female nurse was admitted to the hospital at the Medical College of Virginia; comatose; areflexic; and respiring shallowly, at a rate of five to six times per minute. She required endotracheal intubation and artificial respiration. A history of having ingested a "bottle" of Nembutal in an attempt at suicide was obtained from the husband. Dialysis was performed in the renal laboratory of Doctor Allan M. Unger. At the end of five hours on the artificial kidney, the patient was alert and oriented, respiring regularly at a rate of twenty per minute; and had return of normal reflexes. Psychiatric therapy was begun the next day.

COMMENT.—This case dramatically illustrates the efficiency of extracoporeal hemodialysis in removing barbiturates and in decreasing morbidity as well as mortality in severely intoxicated patients.

CASE 3.—A nineteen year old female was admitted at Oklahoma University Hospital, following a fifteen year history of chronic glomerulonephritis. She had been followed since the onset of her disease and was known to have severe renal insufficiency and advanced vascular disease. An exacerbation of her primary renal disease following an abscessed tooth prompted her admission. At this time, she was noted to have congestive heart failure, anasarca, and signs and symptoms of cerebral edema with grand mal seizures and a semi-comatose condition. Blood pressure was 220 Hg systolic and 120 mm diastolic. Pre- and post-dialysis chemistries are outlined in Table 2. After six hours on the artifical kidney, the patient was alert, oriented, and breathing regularly. She lost eight pounds of edema fluid, manifested by

TABLE 2

Dialysis No.		Results NA	K	CI	CO_2	BUN	Plasma Mg.	RBC Mg.	Weight	Condition
1	Predialysis	126	7.8	88	13	180	5.07	9.23	124	Comatose, Convulsing, congestive failure
	Postdialysis	138	4.3	104	25	72	2.50	5.6	116	Alert and oriented, Breathing regularly

Table 2. Results of hemodialysis on a 19 year old female with chronic glomerulonephritis.

marked decrease in signs of congestive failure and decrease in peripheral edema. She was able to take oral feeding for the first time in several days. The patient was discharged three days after dialysis. She remained relatively comfortable, but deteriorated gradually after almost a month following dialysis and died suddenly at home.

AUTOPSY FINDINGS. — This patient had shrunken kidneys with microscopic evidence of severe chronic glomerulonephritis with an enlarged heart and evidence of congestive heart failure.

COMMENT.—This case demonstrates the capacity of the artificial kidney to temporarily aid the patient with chronic renal disease during a period of exacerbation. Unfortunately, it also supports the impression that remissions in such patients with advanced vascular disease and absence of polyuria are of shorter duration than would be hoped for.

CASE 4.—A twenty-seven year old white male[87] presented at Oklahoma City Veterans Administration Hospital with rapidly progressive chronic glomerulonephritis in the malignant phase. He had a healthy identical twin and monozygosity was varified by phenotyping and skin transplants. Hemodialysis was performed at the Medical College of Virginia in the renal laboratory of Doctor Allan M. Unger, resulting in a significant chemical improvement (Table 3). Two days after dialysis, renal transplantation was performed from the identical twin by Doctor David Hume at the Medical College of Virginia and, twenty-one days later, bilateral nephrectomy to remove the nephritic kidneys, was successful. Subsequently, his blood pressure, urinalyses, and blood chemistries have been normal.

COMMENT.—This case represents the rationale for preparing the patient with chronic renal disease for a surgical procedure aimed at improving renal function.

Summary

The history and principle of hemodialysis are briefly discussed. An outline of the types of cases that may be benefited by the use of the artificial kidney is given, with specific details concerning the selection of individual patients. Possible contraindications and complications are discussed. Four case reports are included as examples of the types of results to be expected from the clinical application of extracorporeal hemodialysis.

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TABLE 3

DIALYSIS NO.		Results Na	K	CI	CO_2	BUN	Creatinine	Ca	Phos
	Predialysis	131	5.6	94	17	124	16.2	9.6	7.2
1	Postdialysis	141	3.8	99	25	54	7.8	10.4	3.5

Table 3. Results of hemodialysis on a 27 year old male with chronic glomerulonephritis two days prior to renal transplantation from his identical twin.

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THE MEDICAL SCHOOL LIBRARY is displaying a collection of old books on epidemics, including Daniel DeFoe's "History of the Great Plague in London in the Year 1665." Volumes date back to a reprint of a 1722 book.

HISTOCHEMICAL COMMENTARY

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After receiving his Ph.D. in Anatomy, John F. Lhotka, Jr., M.D., graduated from the Northwestern University Medical School in 1951. He is now Associate Professor of Anatomy at the University of Oklahoma School of Medicine.

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THE FIELD of "Histochemistry" as a definite discipline has only recently risen into prominence. Prior to World War II it had been in the main submerged into the encompassing field of "microtechnic" and very few investigators followed it as a primary interest. Cajal, Pappenheim, Unna, Golgi, Erlich, Feulgen, and many others occasionally dipped into the field in the course of their studies but with the exception perhaps of Feulgen, it was only a passing phase. They utilized histochemical methods, or what they believed to be histochemical methods, in the course of certain investigations and when that study was completed, they passed to other fields. Probably none of them would have considered himself a "histochemist." However, since World War II, interest has been ever increasing in histochemistry and in a few years it has developed from a strictly research tool into an accepted and distinct field within the greater realm of microtechnic. Certain of its procedures are now used as routine processes in the preparation of necropsy sections, surgical biopsies, and in teaching slides for microscopic anatomy, both normal and morbid. However, along with the rapid growth in interest in the field, a number of misconceptions have also developed and many men using the various technics do not really understand them. Consequently, a very brief review on histochemistry should be of interest and of value.

Histochemistry in itself is not new. Investigators have been using certain of its facets since the eighteenth century. Histochemistry as it is understood today probably was given its foundations by the French scientist Raspail early in the nineteenth century. However, with the development and perfection of the anilin dyes, histochemistry as such was almost completely submerged in the blossoming field of microtechnic. The modern era began in 1936 when Lison published his classic work "Histochimie Animale" and revitalized histochemistry as something separate and distinct from general microtechnic. World War II delayed the rebirth but by 1947, it was rapidly developing into a discipline of its own. For example, prior to this period there was not a single journal devoted primarily to histochemical methods and research. Today (1959) there are about a dozen in existence in at least four languages. In addition, many of the older microtechnical and histological journals are devoting increasingly larger amounts of space to this phase of tissue study.

Just what is "histochemistry"? This is an important point since some discrepancies in definition do exist. In broad terms, histo-

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chemistry is that science which attempts to identify and localize at their *tissue sites*, without distorting the anatomical architecture of the structure being examined, the various chemical components which constitute that structure. The important point is that the architectural integrity of the structure under investigation is preserved as far as possible in that state which it possesses in life. Needless to say, this is often more the ideal than the reality but it does represent the ultimate objective of the histochemist. The term "cytochemistry" is often encountered and is used to define certain phases of histochemistry in much the same way that the term "cytology" is used in relation to "histology." However, for all practical purposes, the term "histochemistry" can be used to include all aspects of such investigations from the cellular to the organ levels. The term "microchemistry" is sometimes confused with "histochemistry" but generally this term is restricted to that form of chemical endeavor in which minute amounts of chemicals are used to perform reactions, usually analytical in nature. No attempt is made in microchemical procedures to preserve the architectural integrity of tissues under investigation when such methods are used in biochemical studies.

Theories and Methods

There are a number of basic approaches which may be used in making histochemical studies. These include "chemical" methods in which an analytical chemical reaction is applied to the tissue in question in an effort to identify a particular substance within the tissue, usually by producing an insoluble colored product at its site. "Physical" procedures are also used in which a chemical reaction is not involved but where the histochemical localization is made by means of physical phenomena. This would include, for example, such methods as dissolving dyes in tissue fats, fluorescence technics utilizing dyes which react to ultraviolet light, and such complex procedures as ultraviolet spectrography, x-ray spectrography, spark spectrography, and tracer methods utilizing radioactive isotopes. Certain "physiochemical" technics are also of value such as the use of the dissociation constants of protein substances by staining them with dyes buffered at various pH levels. Finally, microincineration methods have value, especially in the localization of certain heavy metals. In this technique, the slides are prepared routinely and the organic material is driven off by heat. The fired preparation is compared against variously stained control slides for evaluation. Chemical methods may also be applied to incinerated tissues. All in all, these complicated procedures are essentially research methods, and the average person will have little occasion to use them. However, many of the chemical and a few physical techniques have developed into standard procedures and are used as routine methods in hospital and university tissue laboratories. The bulk of these methods constitute the field called by Gomori "microscopic histochemistry" and it is this particular phase that will be covered in this paper. Complex research procedures will be considered only in passing and as they might apply to the more basic technics. One of the difficulties that has developed in histochemistry is that a great many individuals using these procedures do not understand the various fundamental theoretical methods behind the histochemical localization of any particular tissue component. Histochemistry is not synonymous with the term "microtechnique." In microtechnical staining, the principal aim is to color the various tissues in such a manner that they may be differentiated from each other under the microscope. No attempt is made to determine the precise chemical character of the stained structure, other than perhaps to determine its basic or acidic nature. The colorations in histochemical localizations at any particular site are supposed to indicate or suggest the chemical composition of the colored structure or substance. In a routinely stained slide, using, say, the hematoxylin and eosin technique, the problem of false positives, diffusion of chemical substances, or inactivation of components does not exist. The slide will be considered satisfactorily stained if the various structures can be differentiated satisfactorily under the microscope. This is quite the opposite in histochemical preparations where an attempt is made to actually identify certain substances by the colorations obtained. These colorations or localizations as they are called are obtained

by means of a number of various methods which fall into general groups.

The first means of obtaining color at a tissue site is that situation in which the component to be localized is already naturally colored, and the slide need be only processed to demonstrate this fact. This is the case with certain iron pigments normally found in the body and which are colored brown even in an unstained slide. Normally this type of coloration is not particularly desirable but in the broadest sense it can be considered a very simple histochemical localization.

The second general method is one in which the substance to be localized may be colored directly in one step with sufficient selectivity to be classed as a histochemical localization. This would include, for example, the localizing of certain lipid components by dissolving in them colored fat soluble dyes. The demonstration of nucleic acids with the biologic stain methyl green also falls into this category.

A third method commonly used is to perform a chemical reaction on the substance to be localized producing radicals which may be subsequently demonstrated by second reaction. The various polysaccharide localization methods in which periodic acid reacts with the 1,2 glycol linkages of the tissue polysaccharide to form aldehyde radicals, which are then demonstrated by means of Schiff's reagent, is a good example. This is a two step reaction in which 1) radicals are produced from the component to be localized and 2) the radicals are stained violet by the leucofuchsin. The important point to remember is although the reaction is done in two steps the component that is eventually colored is a product produced *directly* from the substance to be localized. Another fourth method is a somewhat complex variation of method three. In this particular technique, also usually done in two or three steps, a reaction is performed between the component to be localized and a second compound. The substance to be localized is joined to the introduced compound and the coloring localization is then performed upon the introduced compound. The difference between this type of reaction and method three is obvious. In method three, the actual color reaction is performed upon the products of the substance to be localized, where as in this procedure the coloring is not directly imposed on tissue component but rather upon the introduced substance bound to the tissue component. The Hale iron technique for acid polysaccharides is a method of this type. Dialyzed iron is bound to the acidic groups of the acid polysaccharides and then a routine Perls iron Prussian Blue localization is performed on the section. Thus, the sites of the acid polysaccharides are demonstrated indirectly by means of the iron reaction.

Other technics are also used which are similar to methods three and four but involve multiple steps. In general the first step is to modify in some manner the component to be localized. This modified component is then either directly attacked as in method three or united with another substance as in method four. Finally, the coloration is produced at the tissue site. Certain cation localization methods for "bound" components are of this type. First, the bound element must be released from its organic bonding and then the actual localization reaction is performed. There are, in fact, a number of methods which utilize four or more successive steps but the delicacy of such techniques is obvious and a few of the more reliable histochemical procedures fall into this category.

Enzyme localization techniques are slightly different in nature although basically they follow the same patterns. The main difference between enzyme and other tissue localizations is that the activity of the enzyme plays a vital role in the localizing mechanism. Basically there is one over all procedure. This consists of one in which the enzyme reacts with a chemical in a substrate during a period of incubation to produce a compound at its site which may be demonstrated chemically by one of the methods previously listed. The alkaline phosphatase localizations provide an excellent example of the technic. The classic method is one in which the enzyme during substrate incubation precipitates a calcium salt which is then demonstrated by means of a cobalt or

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silver histochemical substitution technique. The exact methods vary but the principal is the same whether a relatively simple technic like the illustration is used or if the more complex procedures utilizing tetrazolium compounds are involved. Many of the localization methods are quite complicated, especially in the formation of the substrate.

It can be seen from this general outline that the histochemical localizations may be a complex matter and some of them may be somewhat questionable. The accuracy of any particular method will depend upon several factors. The first important point to consider is the known chemical specificity of the particular chemical or physical reaction involved in making the localization. Thus in a procedure such as the periodic acid method for polysaccharides with a known and reliable chemical mechanism involved we are dealing with a procedure which can be considered almost specific within its chemical limitations. On the other hand, with a procedure such as the Alcian blue method for acid polysaccharides which is based on metachromasia, a reaction not entirely understood, the accuracy of the technique is somewhat less exact. Such a method must be considered only highly "selective" rather than "specific." The enzymes reactions are even more complex, and true "specificity" in many of these techniques is often more optimistic than factual.

The objective of this paper is not to discuss details of localization, but it might be of value to review the histochemical status of the principal tissue components.

Tissue Processing

Before considering the histochemical status of the various principle tissue components, it might be of value to comment briefly on certain aspects of tissue processing. When tissues are prepared for routine microtechnical staining, they pass through a number of standardized steps, fixation, embedding for sectioning (usually involving the process of dehydration), sectioning, staining (which again may involve hydration and dehydration) and finally mounting of the completed stained section with either water soluble or synthetic media and a cover slip. At some point in this sequence the tissue sections are fixed to slides, usually after sectioning but in some cases after staining. In general, within the limits of reason, nothing is too critical in most cases in the sequence except during the actual staining and a few minutes either way makes little difference in the ultimate outcome. The composition of the fixing fluid, except in very specific cases such as certain silver stains, is not too vital providing it accomplishes its mission without distorting the tissues involved. This is certainly not the case in histochemical procedures. The fixation must be exact and in the proper fluid, if fluid is to be used at all in the fixation. Tissues can not be placed in 10% buffered formalin, the workhorse of most necropsy rooms, and later be processed indiscriminately for histochemical localizations since the fixation will have already destroyed the possibilities of success in many cases. The very act of paraffin processing, regardless of fixation, will ruin the chances of most localizations of lipids and enzymes, not to mention the even more delicate tissue components. The use of salts in the fixative, such as in Zenker's solution, will ruin many histochemical possibilities although the use of salts may even be indicated in other procedures (chromation for certain forms of lipid localizations, for example). As a rule, carbohydrates and proteins will show greater resistance to routine formalin fixation and paraffin processing but other components usually need special consideration. Fixation in such unusual fluids as ice cold acetone may be indicated and in many cases of enzyme work, the freeze dry apparatus must be utilized. If any histochemical procedures are indicated, the investigator must take this into consideration and take appropriate steps from the very beginning. Once a tissue block is fixed in the wrong fluid, it can not be refixed in the proper one. This is also true in embedding. You can not perform enzyme localizations on the usual paraffin section. Frozen sections are frequently the only acceptable ones for such procedures. Special considerations must usually be taken when certain of the "physical" histochemical methods are used. Autoradiographs, for example, may need special processing although the investigator must remember that a "tagged" ele-

ment will react histochemically exactly as an untagged one will in most cases and nothing unusual should be expected in its chemical reactions just because radioactivity is present. All in all, the preceding paragraph can be summarized by paraphrasing the High Lord Executioner in the Mikado and saying "Let the processing fit the procedure."

Nucleic Acids

Histochemical localization of nucleic acids is probably one of the oldest recognized series of techniques now in histochemical existance. The Feulgen procedure for the desoxyribose nucleic acid complexes dates back to 1924. This method is based on the hydrolysis of the tissue nucleic acids with dilute hydrocloric acid, followed by staining of released aldehyde radicals with Schiff's reagent. The sites of desoxyribose nucleic acids are then stained violet. The specificity of the Feulgen technique has been the subject of a vast controversy over the years. Its specificity has been questioned on numerous occasions but today the concensus appears to be that the method, if not specific, is exceedingly selective for the desoxyribose nucleic acid complex. The Feulgen reaction has been used widely in research in all fields of microscopic anatomy and has been very popular in the study of certain malignancies. Another method for nucleic acids that has received prominence is the pyronin-methyl green technique. This is essentially an old method that goes back to the work of Pappenheim in 1889. However, this method has been revived by Kurnick and others, and the thesis developed that the methyl green was specific for desoxyribose nucleic acid complexes, while the pyronin simultaneously demonstrated the ribonucleic acid complexes. Subsequent studies have shown that some aspects of the reaction are probably not reliable, but the specificity of the methyl green has some validity. The methyl green-desoxyribonucleic acid mechanism is believed to be based on a direct reaction of the dye with the acid complex and is in the nature of a polymerization phenomenon. There are other methods for nucleic acids but these two technics are representative of the most popular procedures. The use of enzymes in a negative approach to nucleic acid localization is also very popular. Sections are treated with nucleases and the effect on subsequent localizations noted. This sort of comparison evaluation has, in fact, played an important role in developing many histochemical methods for other components as well as nucleic acids.

Proteins

Protein histochemical reactions are not especially popular probably because the overwhelming bulk of any particular tissue is protein. In many ways, the eosin staining in any routine hematoxylin-eosin staining method could be considered in a wide sense a protein histochemical procedure. Many of the standard biochemical techniques for proteins, such as the xanthroproteic method, are not generally used in histochemistry because the severe treatment destroys the architecture of the tissues and renders invalid the primary purpose of a histochemical localization. Some standard biochemical tests for protein, Millon's reaction for example, may be utilized for histochemical localization within certain limits. However, certain of these methods have been adapted to histochemistry with some success such as the alloxan and the ninhydrin techniques. These procedures are based primarily on the reactions of certain radicals normally associated with proteins such as amino groups. The dinitrofluorobenzene technic also falls into this group. These methods are interesting and do possess some degree of specificity. There are, of course, numerous techniques for the individual amino acids found within the protein complexes. The classic example is the Sakaguchi test for arginine. This particular test is specific for derivatives of guanidine which possess at least one unsubstituted hydrogen on each of the amino groups. Of all the amino acids found in the human body, only arginine meets these requirements under normal circumstances. The method has been modified widely since its introduction in 1925 but the principles of the reaction are still the same. Recent histochemical development of tests for the sulphydryl and the disulphide radicals are also of value in protein histochemistry. Such techniques are quite selective and may be considered histochemically reliable, especial-

ly the tetrazolium reduction and dihydroxydinaphthyldisulphide techniques.

Lipids

The most popular and generally satisfactory histochemical localization technics for lipids are primarily physical in nature and are based on dissolving a colored dye in the tissue lipid at its site. In general, these reactions utilizing such dyes as Sudan III or Sudan black are fairly accurate within their limits of sensitivity. However, it is usually necessary to take some care in processing these tissues so that the lipids in question are not modified, dissolved out, or diffused from their normal sites by the solvents used in the procedures. Chromation during fixation will often protect the lipids from solvent action during routine processing and allow the tissues to be paraffin processed. The "plasmal" reaction for acetalphosphatides, the Nile blue method for phospholipids, and the performic acid-Schiff technic for unsaturated lipids all have some merit. The classic osmic acid, actually osmium tetroxide, used since its introduction in 1895 as a means of localizing unsaturated lipids is still very popular but the present consensus appears to be that it is a trifle too general to be considered highly selective in its localizations. The rather complex technics for keto-steroids fall into the lipid category but unfortunately recent developments have shown that these methods, based on ketone reactions, cannot be considered completely accurate. Methods for the localization of the various derived lipids including sterols and their esters and free and esterified cholesterol exist but again are open to some criticism on selectivity. The more complex histochemical technics such as fluorescance and polarized light methods are valuable in lipid work and selective extractions have merit in certain cases.

Carbohydrates

Carbohydrates are probably the most extensively studied tissue components in the histochemical field. This is undoubtedly due to the fact that the various methods for localizing carbohydrates are among the most accurate and reliable technics known. The oxidizing procedures initially introduced into histochemistry by Hotchkiss, MacManus, and Lillie in the later 1940's placed the localization of carbohydrates on a very firm foundation. These reactions are based primarily on the cleavage of the 1,2 gylcol linkage by organic oxidants to produce aldehyde radicals which may be subsequently stained violet by leucofuchsin. Polysaccharides, within known limits, are accurately localized by these methods even in routinely fixed and processed tissues. The oxidation necessary for the reaction is usually obtained with periodic acid but other organic oxidants known to attack the 1,2 glycol linkage such as lead tetraacetate, sodium bismuthate, and phenyliodosoacetate may be used equally well. These reactions illustrate a very important point. When a reliable chemical technique is successfully modified for histochemical purposes, it will generally run true regardless of modifications of any particular part of the reaction. This point present in the 1,2 glycol cleavage series of reactions for polysaccharides, unfortunately is not true of many other histochemical methods.

In addition to the PAS (periodic acid-Schiff) technique and other 1,2 glycol cleavage methods which are believed specific for the so called neutral polysaccharides, numerous other methods do exist. For example, there is the Hale technique, modified widely in recent years, for acid polysaccharides. This method, as previously noted, is based on an iron reaction with acid radicals of the polysaccharides followed by a Prussian blue color localization. Metachromasia is also commonly used in the localization of tissue acid polysaccharides, and such dyes as Alcian blue have been widely used for this purpose. When enzyme techniques are used in a negative way to verify these metachromatic reactions, it would appear that they do possess a degree of selectivity for this particular tissue component. However, since the exact mechanism of the reaction is still in doubt, such methods are best considered "selective" rather than "specific." In addition to these reactions for polysaccharides, there are a number of empirical techniques which appear to have a great deal of selectivity. The classic example is the Best carmine method for glycogen. The exact mechanism of this technique is not understood

but the degree of selectivity obtained is striking. Thus although the reaction is not "specific" in the exact sense, its selectivity is sufficient so that it can be considered highly reliable when used with proper controls. Enzyme studies are of real value in controlling this type of localization. There are, of course, numerous other methods for carbohydrates but these are illustrative of the entire group.

Cations and Anions

The localization of cations probably represents the purest application of analytical chemistry to histochemistry. The two cations which are most commonly studied because of their status in the tissues are calcium and iron. Other cations are occasionally localized but, in general, calcium and iron have received the most attention. Both of these elements exist in the tissues combined with other components in what are called "masked" and "unmasked" forms. A masked form is one in which the elements are so bound with organic components that they cannot be histochemically localized until released from their "bound" status. Sometimes a bound element can be released but often it is very difficult to accomplish this within histochemical requirements of maintaining architectural integrity.

The techniques for calcium and for iron have been well standardized and although they have their weaknesses, they generally possess a high degree of selectivity. For example, the alizarin method for calcium can be used to demonstrate the tissue sites with some reliability, and the von Kossa silver method is also rather accurate for demonstrating calcium. Iron, also present in both bound and unbound states, is classically localized by the Prussian blue reaction, introduced into chemistry by Perls in 1867. The exact way that these methods are applied is somewhat beyond the scope of a general discussion paper but fairly accurate localizations are possible. Technics for unmasking certain forms of masked iron pigments are known and can be applied to make these cations histochemically visable. Masked calcium may also be freed for localization under certain circumstances.

Numerous technics also exist for other cations. The Macallum procedure for potassium has been used widely although it does not compare with the iron and calcium methods for validity of localization. Lead, mercury, arsenic and other metals may be histochemically demonstrated but generally these are not found in the human body except in cases of medico-legal interest. Zinc and copper are found in minute quantities in the body but the localization of these two elements has not been too satisfactory with the existing methods, although recently technics have been reported as effective for zinc. Anyone interested in the details of these various methods will find them discussed at length in any major histochemical text.

The histochemical localization of anions has not been as satisfactory as the demonstration of cations, probably due to their greater solubility. Methods have been devised, of course, for various anions, especially the phosphates and carbonates normally present in the body. However, the anion technics are not too adequate and for the most part based not on chemical reactions but on physical procedures such as phase microscopy and polarized light studies. Even here these methods are only efficient if the anion is present in an insoluble form. If present in a soluble form, it is almost impossible to obtain a satisfactory localization.

Vitamins

The localization of vitamins, with the exception of vitamin C or ascorbic acid, is not satisfactory using chemical technics, although fair localizations have been obtained utilizing physical methods. Fluorescence technics have been used with some success with vitamin A but there is still some question on the validity of the procedures. Technics have also been suggested for the B complex and vitamin D as well, but these methods are questionable even in the hands of an expert. The methods for vitamin C on the other hand, are fairly valid and are based on the reducing action of the ascorbic acid itself. Silver solutions are generally used resulting in a deposit of reduced silver at the tissue site of the vitamin. Such methods have been successfully used in studies of the adrenal gland. Disregarding vitamin C, it can be safely said that there are no routine

methods available for vitamin histochemical localization.

Pigments

The histochemical category of "pigments" is somewhat artificial since they are more properly studied under their respective protein and lipid groupings. However it is traditional to include such a section so a few brief remarks are in order. Pigment studies are one of the oldest forms of histochemical endeavor. That "DOPA" methods for the tyrosine pigments, the melanins in particular, date back to the 1920's and the argentaffin and chromaffin reactions of certain cells and structures, usually classed in this category, have been known for years. The iron pigments, probably the best known in the body, are usually localized by cation technics with the organic components being disregarded except in those cases where it "masks" the iron from the histochemical localizing reaction. Fluorescence methods are useful in pigment studies and are frequently used to supplement chemical technics. Porphyrin localizations are a good example of this type of localization. Certain lipochrome localizations are only possible by this means. The time honoured silver and chromium reactions, previously mentioned, are so well known that no comment is required except to note that they are becoming of interest again with the revived attention to tissue argyrophilia and to the recent studies on the carcinoid tumors of the small intestine. Some pigments are visible after routine processing without actual staining, hemosiderin for example. However in practice it is usually best to perform a histochemical coloring reaction on such pigments to improve their visibility under the microscope and to differentiate them from each other on the basis of their responses to the reactions.

Enzymes

Enzymes are probably the most studied group of tissue components today with at least 50% of the articles appearing presently in the histochemical journals being devoted to their localization. The technics for enzyme studies are numerous and are frequently quite complex requiring special processing. Fixation, for example, must be carefully handled to avoid destruction of the enzyme and in many cases a complex apparatus such as the freeze-dry must be utilized. Frozen sections are almost routine since the various steps in paraffin processing destroy almost all of the more delicate enzymes. Once in section form, however, enzyme technics, within a broad sense, are all quite similar. The section is incubated for varying periods of time in a "substrate" solution which contains the various chemical compounds required to obtain the localization through the action of the enzyme resulting in a precipitation of a colored substance at the enzyme's site. Substrate solutions are in themselves somewhat complex and vary depending on the enzyme to be localized. The pH of the solution is often very important. In some cases the precipitate is not colored and additional steps are necessary to color it so that the tissue sites will be visible under the microscope. The finished section is then mounted in either glycerine or one of the synthetic compounds depending on the exact nature of the procedure involved. This may appear rather simple but in practice enzyme histochemical localizations are exceeding complicated and difficult. The investigator in order to obtain a valid localization must be sure that first, nothing is done during processing to destroy the enzyme, alter its nature, or diffuse it from its normal sites. Secondly, he must be sure that his method actually is selective for the enzyme in question and in addition is sufficiently sensitive to react with the minute quantities of the substance in the tissues. When the delicate nature of the average enzyme is taken into consideration it can be seen that this is no mean problem. Even when the investigator is able to obtain enzymatic localizations it is vital that careful controls be maintained since false positives and even false negatives will result with most methods now used for this purpose.

Some enzyme systems localize rather well such as the alkaline phosphatases. This group will even resist formalin fixation and paraffin processing if a few precautions are taken during the procedures. On the other hand, localizations of more delicate systems such as the dehydrogenases are quite ca-

pricious and great care must be taken in their interpretation. It is most important that any person undertaking histochemical enzymatic studies understand the rationale behind the method he is using as well as having a full understanding of the nature of the enzyme under investigation. If this is done, many pitfalls and disappointments can be avoided. It is equally important to remember that with a few exceptions these methods are hardly routine laboratory procedures and must be performed by someone fully acquainted with the details of the methods and with a background of histochemical technic.

Conclusions

Histochemistry has come a long way since its revival in 1936 by Lison. It has progressed from a stepchild of microtechnic until in many ways it has replaced the mother field in many phases of both research and routine tissue processing. Many special procedures have been developed utilizing equipment not even known a generation ago. The freeze dry apparatus, so necessary to enzyme studies, the phase contrast microscope, polarized and ultra violet light methods, are all common place in the laboratory when just a few years ago they were restricted to research centers. Unfortunately, with the rapid growth of histochemistry, many misconceptions have also developed. The use of the term "specific" in describing methods for localizations is frequently most unfortunate. "Highly selective" would usually be far more appropriate to define the character of many popular procedures and in some cases even this classification is too optimistic. Generalities have also tended to creep into histochemical terminology, such as the common statement "The periodic acid-Schiff technic is specific for polysaccharides." Taken literally, as it is by the uninitiated, such a statement can cause real confusion, since it is not true on several counts and an analysis of the mechanisms involved in the reaction make it obvious. To be precise, the PAS, as it is usually abbreviated, is specific for the *1,2 glycol linkage* which is found in polysaccharides but even here trouble can develop since the cleavage mechanism can also take place with other linkages such as the 1 glycol, 2 amino one. However, it must be conceded that if *properly controlled,* the PAS does localize the 1,2 glycol linkage in a most highly selective manner. Hotchkiss, though, in his excellent paper on the reaction pointed out that the PAS will not give positive colorations with many tissue components known to contain this linkage. Di-saccharides, for example, are negative to this reaction (or very weakly positive). Consequently such wide sweeping statements should probably be avoided, or at least qualified, when dealing with individuals unacquainted with the field. The enzyme methods in particular require careful evaluation and any investigator using them must take the trouble to understand the mechanisms involved in the localizations. This knowledge is vital in order to make any histochemical evaluation and much of the confused data that appears from time to time in the literature might be avoided if this were done.

Histochemistry today is at a crossroads. With intelligent handling, it will progress until it can rank with the other biochemical fields as a basically exact science. However, unless care is taken to impress the investigators using histochemical technics with the necessity of understanding their procedures completely, the resulting doubtful data can do histochemistry a great injustice. Many non-histochemists, certain hospital pathologists in particular, have commonly relegated the task of performing, and in some cases even evaluating, histochemical localizations to assistants who lack full knowledge of what they are attempting to do with the tissues involved. True, many of the technics are relatively foolproof such as the PAS and Feulgen method for nucleic acids and can safely be so delegated. Other procedures, the enzyme localizations and the complex "physical" technics, are not foolproof and it is absolutely necessary to have close supervision of the processing by the chief investigator or a qualified aide. In many cases the critical steps should probably be performed by the investigator himself and in all cases, the final evaluation *must* be done by an informed individual. Otherwise trouble is inevitable.

Properly used, histochemical methods can be valuable tools in medical research. In

the past few years much has already been accomplished by this means. The role of polysaccharides in the tissues has been greatly clarified. Tissue-enzyme relationships, in spite of the weakness of some of the methods, have been most revealing. Lipoidal diseases are more fully understood as a result of differential histochemical investigations. Our understanding of the role of nucleic acids in various metabolic processes has been greatly increased. These are only few of the many advances accomplished by histochemical means. There will be many more in the future.

The author sincerely believes that much of the future of microscopic anatomy, normal and abnormal, is to be found in this field. The critical point is that the investigator utilizing this research tool must know the theoretical side of his methods with their virtues and limitations and must equally understand the nature of the substances he wishes to localize in the tissue. If this is done, he will find histochemical methods as valid and as reliable as any now available to the worker in the biologic fields, but if he does not do this, histochemistry will prove to be not a valuable asset but a Frankenstein's monster, which will cloud and confuse his research with questionable data.

Recommended References for Additional Information

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ERANKO, O. *Quantitative Methods in Histology and Microscopic Histochemistry.* 1955. Little, Brown & Co., Boston. (Advanced but excellent text on quantitative histochemical methods. May be somewhat beyond the average biologist.)

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PEARSE, A. G. EVERSON. *Histochemistry, Theoretical and Applied.* J. A. Churchill, Ltd., London. 1953. (Probably the best histochemistry text now available in English. It contains theoretical discussions and has a good listing of preferred technics tested by the author.)

REPRESENTATIVE JOURNALS

Stain Technology (Published bi-monthly by the Biological Stain Commission through Williams and Wilkins, Baltimore.)

Journal of Histochemistry and Cytochemistry (published bi-monthly by the Histochemical Society through the Williams and Wilkins, Baltimore.)

International Review of Cytology (published yearly by the Academic Press, New York, and edited by G. H. Bourne and J. F. Canielli.)

Acta Histochemica (published in four sections a year by Gustav Fischer Verlag, Jena.)

Annales d'Histochimie (published in four sections a year by the Societe Francaise d'Histochimie through the Societe d'Impressions Typographiques, Nancy.)

Histochemische Methoden (edited by Walther Lipp and published by R. Oldenbourg, Munich, at irregular intervals.)

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ABSTRACTS

Comparative Effects of Parathyroid Extract and Turpentine Abscesses on the Serum Glycoproteins and the Polysaccharides of the Kidney

M. R. SHETLAR,* R. PALMER HOWARD,** WALTER JOEL,*** DOROTHY C. BOWLING,**** and CLARA L. SHETLAR*****

The American Journal of Physiology, **195:** 535-538, December, 1958

Studies were made of the time relationships existing between administration of parathyroid extract to rats, the elevation of serum glycoproteins and the deposition of polysaccharide and calcium in the kidney. Statistically significant elevations of seromucoid occurred eighteen hours after the injection of turpentine and 24 hours after the first injection of parathyroid extract. These data may indicate that the effects of parathyroid extracts and turpentine on seromucoid differ. Statistically significant elevations of the serum glycoproteins other than seromucoid occurred at 36 hours in both groups. The first histochemical changes in the kidney were noted 36 hours after the first injection of parathyroid extract. Intratubular lesions were noted which contained both calcium and material which stained with periodic-acid-Schiff reagent (PAS), colloidal iron and Alcian blue. Later (48 hr. after injection) another type of lesion which stained only with PAS and did not contain calcium was noted. Consequently, no definite evidence was found for the occurrence of a polysaccharide-containing lesion prior to calcification. Only cloudy swelling of the tubules was noted in the kidneys of rats injected with turpentine. Since the injection of turpentine resulted in elevated seromucoid and other serum glycoprotein levels, it is concluded that such elevations do not result per se in kidney damage.

*Associate Professor of Biochemistry.
**Associate Professor of Research Medicine.
***Professor of Pathology.
****Research Assistant.
*****Department of Biochemistry.

Steriod Influences upon the Lactic Dehydrogenase-DPNH Oxidase System of the Rat Uterus

ARLEY T. BEVER.*

Annals of the New York Academy of Sciences, **75:** 472-490, 1959

Investigation of the effect of several steroids administered subcutaneously to ovariectomized rats indicates that estrogens have the most potent stimulatory effect upon lactic dehydrogenase (LDH), DPNH oxidase and DPN-cytochrome c reductase. With three naturally occurring estrogens, the order of activity for effect upon DPNH oxidase in a 72 hour response test was (1) estradiol-17β > (2) estrone > (3) estriol. The order of decreasing potency for LDH promotion, however, is (1) estriol > (2) estradiol-17β > (3) estrone.

When estrogens are administered daily for longer than three days, a constant elevated activity level of LDH and DPNH oxidase was not maintained. Maximal activity was reached in three days with estradiol and in six days with estriol. A rapid decline then occurred to minimum levels near that of the non-treated controls. Estradiol and estriol given together appear to be antagonistic in promotion of DPNH oxidase since the activity level is near that of estriol alone.

Hypophysectomy, adrenalectomy and combined operations do not prevent or augment the initial rise in DPNH oxidase when estradiol is given. None of the three procedures prevents a subsequent fall in activity after a maximum value is reached. Adrenalectomy markedly increased the time required to obtain both maximum and minimum activity.

Ovariectomized rats were given progesterone, deoxycorticosterone acetate (DCA), and testosterone. Each steroid was administered alone and in combination with estradiol. The results showed that only progesterone and DCA significantly influence the enzyme levels. Progesterone alone increased LDH activity and depressed DPNH oxidase activity. In combination with estradiol, progesterone prevented DPNH oxidase increases elicited by estradiol. High LDH activity response to progesterone was lowered when estradiol was given simultaneously. DCA administration increased both LDH and DPNH oxidase. DCA with estradiol produced lower DPNH oxidase activity than estradiol alone.

Studies of uterine DPNH oxidase and DPN-cytochrome c reductase indicate both enzymes respond qualitatively and quantitatively alike to estradiol and to certain inhibitors.

*Associate Professor of Biochemistry.

Rapid Diagnosis of Herpes Simplex Virus Infections with Flourescent Antibody

JOSEPH Z. BIEGELEISEN, Jr.,* L. VERNON SCOTT,** and VESTER LEWIS, Jr.***

Science, **129:** 640, 1959

A fluorescent microscope technique is described which may prove useful in differentiating clinically similar lesions into lesions of herpes simplex virus etiology and non-herpetic lesions. Herpes simplex virus was isolated from the specimens which yielded positive fluorescence, and no virus was isolated from the specimens which yielded no fluorescence. This method of diagnosis reduces the time required at present from several days to hours and may prove to be invaluable to the dermatologist in differentiation of lesions of herpes simplex virus from those caused by other agents.

*Communicable Disease Center, Chamblee, Georgia.
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***Research Assistant, Department of Microbiology.

Activation of the Free Wall of the Right Ventricle in Experimental Right Bundle Branch Block

LOYAL L. CONRAD, and T. EDWARD CUDDY

Circulation Research, Vol. VII, No. 2, March, 1959, pp. 173-178

Ten experiments were performed on dogs to determine if alterations in endocardial spread and right ventricular conduction occur with right bundle branch block. After right bundle branch block, accession spread radially at the earliest point activated and tangentially at later regions, endocardial activation preceding epicardial. Endocardial spread was slower after right bundle branch block. Conduction through a specialized syncytium was either absent or greatly altered. The pattern of activation of the right ventricle after right bundle branch block resembled that obtained by electric stimulation of a single endocardial point before block. After right bundle branch block, activation of the right ventricle appeared as though it proceeded from several points in a small area. The tangential pattern of spread after right bundle block precluded an estimation of right ventricular thickness by measurement of the time of onset of the intrinsic deflection. An R was recorded at all points in the ventricular wall from endocardial to epicardial surfaces. Bipolar leads did not contribute additional information.

From the Department of Medicine, University of Oklahoma School of Medicine, and the Veterans Administration Hospital, Oklahoma City, Oklahoma.

Supported in part by a grant-in-aid from the American Heart Association, National Heart Institute (Grant H-1889), and the Shipman Heart Research Fund.

Hemagglutination with Herpes Simplex Virus I. Adsorption Studies as Evidence that the Antigen-Antibody Reaction is Specific and the Neutralizing and Hemagglutinating Antibodies Are Identical

FRANCES G. FELTON* and L. VERNON SCOTT**

J. Immunol., 80: 186, 1958

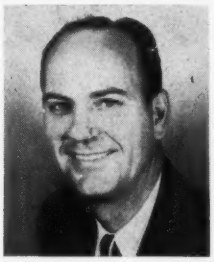
Herpes simplex virus, which by the usual technique of hemagglutination is inactive, has been shown to produce hemagglutination in the presence of specific immune serum. This virus was adsorbed onto sheep erythrocytes which had been treated with tannic acid. These tannic acid-virus treated cells agglutinated in the presence of specific immune serum.

The antibody in herpes simplex immune serum can be removed by adsorption with tannic acid treated and virus sensitized sheep erythrocytes. The removal of this antibody as demonstrated by both hemagglutination and infectivity techniques, indicate that the herpes simplex neutralizing and hemagglutinating antibodies are probably identical and that a specific antigen-antibody reaction is involved in the hemagglutination test with herpes simplex virus.

*Clinical Laboratories, Veterans Administration Hospital, Oklahoma City.
**Professor of Microbiology.

Regents Approve Two Appointments

LOWE



CREWS

University of Oklahoma Regents have approved the appointment of Doctor Robert C. Lowe to a full-time academic position on the Medical School faculty and named Raymond D. Crews to succeed him as superintendent of University hospitals.

The transfer was effective July 1.

Doctor Lowe, superintendent the past ten years, asked to be relieved of administrative duties in order to develop a research program in the field of hospital operation.

Crews will assume the responsibility of superintendent in addition to serving as business administrator of the Medical Center, a position he has held since 1954. He also is an assistant professor of administrative medicine.

Doctor Lowe's new title is research consultant in hospital organization and administration. In addition, he is an associate professor of medicine and of preventive medicine and public health.

Crews is president of the Oklahoma Hospital association, a past-president of the Oklahoma Association of College and University Business Officers and of the Oklahoma City Hospital Council. He holds a BA degree in economics and LL.B. degree from the University of Oklahoma. The new superintendent came to the Medical Center as assistant business administrator in 1951.

Doctor Lowe, a graduate of the University of Minnesota School of Medicine, joined the Medical School faculty in 1946. Before coming here, he taught at the University of Iowa and Louisiana State University Schools of Medicine and was a research associate in psychiatry and psychosomatic medicine at College of Physicians and Surgeons, New York City.

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PRESIDENT'S LETTER

If any doctor has a tendency to allow the heritage of this great profession to create an overwhelming sense of self-righteousness, it might be well to remember the words of Robert Burns:

"O wad some power the giftie gie us

To see oursel's as ithers see us!"

—And then read "The Doctor Business" by Richard Carter.

Such chapters as "Dollar Doctrine", "Medical Democracy", "Medical Delinquency", "Scandal in the Coal Fields", "AMA vs. Government", are apt to stimulate thought and wonder.

If individually and as a profession, we could attain the exalted concepts we have of ourselves, the realization of such an image would be the answer to most criticisms such as are made in this book.

Alfred T. Baker M.D.

ALFRED T. BAKER, M.D.
President

Medical News

Oklahomans Provide National Leadership for Medical Assistants

Nearly one hundred persons paid tribute to Mrs. Lucille Swearingen, President of the American Association of Medical Assistants from Bartlesville, and Leo J. Starry, M.D., National Advisor from Oklahoma City, when the state chapter of the organization held a reception and tea on July 19 at the Oklahoma Medical Research Foundation. Invitations were sent to all medical assistants, their physician-employers, state medical association officers and staff, and all Oklahoma County physicians.

Oklahoma is singularly honored to have had two such national office holders chosen from its ranks.

Mrs. Swearingen is the third national president of the youthful association which now has a membership of over 7500 assistants, representing twenty states. Her elevation to the position of national prominence represents the culmination of ten years' active interest and leadership in the Oklahoma Medical Assistants Society.

An employee of Doctors Lockard and Wallingford, Bartlesville, Mrs. Swearingen has served her state organization as President, Vice-President, Corresponding Secretary, Parliamentarian and member of the Executive Board. She has also served as Oklahoma's representative on the national Board of Directors.

Doctor Starry was appointed as one of six-physician-advisors to the national group in 1957 and is now completing his last year in this capacity. During his term of office, he has attended national conventions of the association in San Francisco and Chicago, and now plans to participate in the next annual meeting which is scheduled for Philadelphia, October 16, 17 and 18, 1959.

The AAMA

The organization reached a milestone in its maturity last April when a national headquarters office was opened in Chicago and a full-time executive secretary employed. Article two of the group's constitution explicity sets forth the aims of the organization:

(a) To inspire its members to render honest, loyal and more efficient service to the profession and to the public which it serves.

(b) To strive at all times to cooperate with the medical profession in improving public relations.

(c) To render educational services for the self-improvement of its members and to stimulate a feeling of fellowship and cooperation among the societies.

(d) To encourage and assist all unorganized medical assistants in forming local and state societies.

(e) This organization is hereby declared to be non-profit. It is not nor shall it ever become a trade union or collective bargaining agency.

The AAMA has the full blessing and cooperation of the American Medical Association. It is the only group of its type to achieve this recognition.

An extremely interesting and informative program has been planned for the Third Annual Convention in Philadelphia. Among those slated to address the group are: Louis M. Orr, M.D., President, American Medical Association; Hugh W. Brenneman, Public Relations Counsel for the Michigan State Medical Society; Leonard Berry, author of "Magic With Words"; and a panel discussion on such subjects as "Office Psychology", "RH Factor", "Hypnosis In Medicine" and "Advances In Cancer".

OAGP and Medical Center Plan Symposium

A symposium on Medical and Surgical Problems in the Senior Citizen will be conducted by the Oklahoma Academy of General Practice and the University of Oklahoma Medical Center, Friday, October 2, at the Skirvin Tower Hotel in Oklahoma City.

Seven eminent guest speakers will appear on the program, discussing problems in rehabilitation, cardiovascular disease, diabetes, operability, and use of steroids. Lederle Laboratories is co-sponsoring the conference.

The scientific program will consist of six papers, three to be presented in the morning and three in the afternoon with each session to be followed by a question-answer period.

Luncheon speaker will be Leo M. Wachtel, Jr., M.D., Jacksonville, Fla., whose talk is entitled "People Who Live in Glass Houses, Shouldn't." Doctor Wachtel is a past-president of the Florida Academy of General Practice and a member of AAGP's Commission on Hospitals. He has been in general practice in Jacksonville since 1940.

Lecturers and their topics are:

Walter L. Arons, M.D., chief of the Endocrine Clinic at Stanford University, "What Answers Have Steroids for Problems Peculiar to the Aged?"

Bentley P. Colcock, M.D., of the surgical staff of the Lahey Clinic, New England Baptist and New England Deaconess hospitals, Boston, Mass., "Gastrointestinal Hemorrhage of the Aged."

William Requarth, M.D., assistant professor of surgery at the University of Illinois College of Medicine and attending surgeon, University of Illinois Research Hospital and West Side Veterans Hospital, Chicago, "Evaluation of Operability of the Older Patient."

John W. Gofman, M.D., Ph.D., professor of medical physics and clinical instructor in medicine, University of California Medical School, "Prediction of Myocardial Infarction."

Leo P. Krall, M.D., member of the senior staff of the Joslin Clinic and New England Deaconess Hospital, Boston, and consultant to the U.S. Public Health service, "Oral Control of Diabetes Mellitus—The When and Why."

Donald A. Covalt, M.D., associate director, Institute of Physical Medicine and Rehabilitation of the New York University-Bellevue Medical Center and associate professor in the Department of Physical Medicine at NYU College of Medicine—"Down-to-Earth Care of the Stroke Patient."

Doctor Covalt is a consultant to the Department of Health, Education and Welfare's Office of Vocational Rehabilitation and to a number of rehabilitation centers.

Roger Reid, M.D., Ardmore, president of the Oklahoma Academy of General Practice, will preside at the noon luncheon. Sessions will be in the Persian Room.

Moderator for the morning program will be Stewart G. Wolf, M.D.; the afternoon session, Gilbert S. Campbell, M.D. Doctor Wolf is head of the department of medicine and Doctor Campbell, professor of surgery, at the University of Oklahoma Medical Center.

New York Site for International Congress on Occupational Health

Plans are being formulated for the 13th International Congress on Occupational Health to be held in New York City in 1960, the first ever scheduled in the Western Hemisphere. About 2,500 physicians, nurses, industrial hygienists and other delegates from more than 50 countries are expected at the congress which will be held from July 25 through July 29th.

All previous meetings have been held in Europe, beginning with the first one in Milan in 1906. The 12th congress was in Helsinki in 1957.

The congresses on occupational health are sponsored by the Permanent Committee and International Association on Occupational Health of which Doctor Sven Forssman, of Stockholm is president and Doctor Enrico Vigliani of Milan, is secretary.

Headquarters for the 13th Congress will be in the Waldorf-Astoria Hotel, where all sessions will be held. Plans for translation services, accommodations for the visitors and other arrangements were begun last year.

Theme of the New York meeting will be prevention, rather than cure and program participants from the many countries will report on their experiences, the findings of both clinical and laboratory research, and on methods of control of occupational health hazards. Important knowledge in the fields of occupational injury and disease will be shared by experts of many nations.

James W. Muckell, of White Plains, New York, who has served as conference planning officer for the United Nations General Assembly sessions, both here and abroad, has been named executive secretary for the 13th Congress.

Southwestern Surgical Congress Announces Essay Contest

The Southwestern Surgical Congress announces its Second Annual Essay Contest.

The Contest is open to internes, residents and M.D.'s in active training in general surgery or the surgical specialties, who have been in private practice no more than three years beyond completion of resident, interne and post-graduate training. Eligibility is further restricted to those individuals who are within the geographical confines of the Southwestern Surgical Congress.

The subject material for the competitive essays shall be either pure investigative or scientific research, or clinical research and investigation, which shall consist wholly or largely of the essayist's contributions. The work is intended to encourage original study and investigation on the part of the essayist himself.

The first prize will be $300.00, second prize $200.00, and third prize $100.00. The essayists whose papers are selected to be read, will be the invited guest of the Southwestern Surgical Congress to their Twelfth Annual Meeting in Las Vegas, Nevada, March 28, 29, 30, 31, 1960, this to include the essayists wives. This includes lodging, meals and the social functions of the organization, but does not provide transportation to and from the meeting.

Interested persons please contact John A. Growdon, M.D., 1324 Professional Building, Kansas City, Missouri.

Leading Surgeons to Speak for International College of Surgeons

Leading surgeons from many parts of the free world will present scientific papers at the 24th annual Congress of the North American Federation, International College of Surgeons, to be held at the Palmer House, Chicago, September 13-17.

Among the special features will be military reports on medical operations and research in climatic and environmental extremes, to be presented by six Navy medical officers. Their reports will cover the problems of space flights and prolonged stays in frigid zones, tropical climates, or under water.

Prof. Doctor Andre Thomas of the Faculty of Sciences, the Sorbonne, Paris, inventor of an artificial pulmonary membrane, will give a demonstration of progress in artificial cardiopulmonary circulation and the physiological and surgical results obtained from the use of his instrument.

The annual Acuff Memorial Lecture will be presented by Prof. Doctor Sten Friberg, Professor of Surgery, University of Stockholm, Sweeden.

Among other foreign speakers of note and their subjects will be: Doctor Ralph B. Cloward, Honolulu; Chief Surgeon, Queens and St. Francis Hospitals—"Surgery of the Cervical Intervertebral Disc and Fusion of the Cervical Spine from an Anterior Approach"; Doctor Jean Creysell, Lyons, France; President of the French Section, I.C.S.—"Necrosis in Closed Injuries, Particularly Those of the Head of the Femur"; Doctor Raymond Darget, Bordeaux, France; Professor of Urology, University of Bordeaux —"Extensive Tumors of the Bladder"; Doc-

tor Mario Gonzales-Ulloa, Mexico City; Director of the Sanatoria Dalinde—"Procedure for the Integral Correction of the Human Profile"; Doctor Hajime Imanaga, Nagoya, Japan; Professor of Surgery, Nagoya University—"Surgical Treatment of Portal Hypertension"; Doctor Alfonso de la Pena, Madrid; President of Spainish Section, I.C.S., and Professor of Urology, Faculty of Medicine—"Coxi Anal Prostatectomy"; Doctor Jose Ramirez, D., Guayaquil, Ecuador; Founder and Vice President of the Ecuador Section, I.C.S.—"Role of Pelvic Exenteration in Treatment of Pelvic Cancer"; Doctor Esteban D. Rocca, Lima Peru; Professor of neurosurgery, National Medical University —"Surgical Management of Cysticercus Cysts of the Brain"; Doctor Hans Selye, Montreal; University of Montreal—"Stress and the Adaptation Syndrome"; Mr. John Swinney, Newcastle upon Tyne, England; Lecturer in Urology, Medical School, King's College, University of Durham—"Treatment of Strictures of the Urethra and Its Sequalae"; Doctor Jorge A. Taiana, Buenos Aires; former dean, University of Buenos Aires — "Bronchial Adenoma"; Doctor Pierre Jean Viali, Paris; Head of the Clinique d'Alma—Subject to be announced; Mr. Charles P. Wilson, London; Senior Surgeon, ENT Department, Middlesex Hospital— "The Value of the Transpalatal Approach to the Nasopharynx".

Besides general assembly programs, there will be sectional meetings covering all the principal surgical specialties. A postgraduate instructional course in orthopedic surgery also will be presented. A scientific motion picture program will demonstrate latest techniques in surgery.

Senator Joseph Lister Hill (D. Ala.) and Senator Hubert H. Humphrey (D. Minn.) will be speakers at nonscientific events. A special program to which lay leaders will be invited also is planned.

The annual banquet will be given on Wednesday evening. The induction of new fellows will take place Thursday evening in the Chicago Civic Opera House.

The North American Federation comprises the United States, Canada, Mexico, Cuba, Haiti, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama.

Further information may be had by writing to the Secretariat, International College of Surgeons, 1516 Lake Shore Drive, Chicago 10.

Pediatric Conference Planned By Hillcrest Medical Center

Hillcrest Medical Center in Tulsa has completed plans for a Dedicatory Pediatric Conference to be held September 25-26, 1959. The conference will be held in connection with the opening of the new six-floor Mabee Children's Hospital wing, built with a $2 million gift from the J. E. and L. E. Mabee Foundation.

The conference will have the following faculty: James C. Overall, M.D., President of the American Academy of Pediatrics and Professor of Pediatrics, Vanderbilt University School of Medicine, Nashville; Frederick C. Robbins, M.D., Nobel Laureate and Professor of Pediatrics, Western Reserve University School of Medicine, Cleveland; Theodore Panos, M.D., Professor of Pediatrics, University of Arkansas School of Medicine, Little Rock; Herbert C. Miller, M.D., Professor of Pediatrics, University of Kansas School of Medicine, Kansas City; and Harris D. Riley, M.D., Professor of Pediatrics, University of Oklahoma School of Medicine, Oklahoma City.

A group of faculty members from the University of Oklahoma School of Medicine will comprise a panel which will appear during the conference.

Social events planned for the participants of the meeting will include golfing on Friday afternoon and a dinner and social hour on Friday evening. On Saturday evening, those attending will have an opportunity to attend the season's first college football game when Tulsa University meets New Mexico A. and M. Special events have been planned for the ladies.

Additional information and reservations forms are available by writing to Hillcrest Medical Center, Tulsa, Oklahoma.

Coming Meetings

Oklahoma Chapter
AMERICAN ACADEMY OF GENERAL PRACTICE
September 13, 1959 — **Lake Murray Lodge**
Ardmore, Oklahoma

The Sixth Annual Meeting of the Red River Valley Section, Oklahoma Chapter, American Academy of General Practice, will be held at Lake Murray Lodge, Ardmore, September 13, 1959. Participants will receive four hours credit, Category 1. For further details, write to Roger Reid, M.D., 1001 15th, N.W., Ardmore, Oklahoma.

OKLAHOMA ACADEMY OF GENERAL PRACTICE SYMPOSIUM
October 2, 1959 — **Skirvin Hotel**
Oklahoma City

The Oklahoma Academy of General Practice, the University of Oklahoma Medical Center and Lederle Laboratories will present a Symposium on "Medical and Surgical Problems in the Senior Citizen," to be held October 2, 1959 in the Skirvin Hotel, Oklahoma City. Further information may be obtained by writing to Nolen Armstrong, M.D., President, Oklahoma City District, A.A.G.P., 2925 N.W. 50th, Oklahoma City, Oklahoma.

THE UNIVERSITY OF TEXAS
POSTGRADUATE SCHOOL OF MEDICINE
Course in Cardiology
December 7-11, 1959 — **Texas Medical Center**
Houston, Texas

The University of Texas Postgraduate School of Medicine has announced the James J. and Una Truitt Lecturer for the year 1959 will be Paul Wood, O.B.E., M.D. (Melbourne), F.R.C.P. (London). The guest lecturer from London will present a course in cardiology at the Texas Medical Center December 7-11.

For further information write to Office of the Dean, The University of Texas Postgraduate School of Medicine, 410 Jesse Jones Library Building, Texas Medical Center, Houston 25, Texas.

24th Annual Congress
INTERNATIONAL COLLEGE OF SURGEONS
September 13-17, 1959 — **Chicago**

The 24th Annual Congress of the North American Federation, International College of Surgeons, will be held in Chicago, September 13-17. The federation is composed of the United States, Canadian, Mexican, and Central American Sections. For information, write to the Secretariat, International College of Surgeons, 1516 Lake Shore Drive, Chicago 10.

13th ANNUAL SOUTHWEST REGIONAL
CANCER CONFERENCE
September 20, 1959 — **Fort Worth, Texas**

The Fort Worth Academy of Medicine will present the 13th Annual Southwest Regional Cancer Conference on September 20, 1959, under the sponsorship of the Tarrant County Medical Society and the Tarrant County Unit, American Cancer Society. Further information may be obtained from the Tarrant County Medical Society, Fort Worth, Texas.

AMERICAN HEART ASSOCIATION
32nd Annual Scientific Sessions
Trade and Convention Center — **October 23-25, 1959**
Philadelphia, Pennsylvania

The 32nd Annual Scientific Sessions of the American Heart Association will be held at the Trade and Convention Center in Philadelphia, October 23-25, 1959. Forms for registering and for reserving accommodations are now available from the Association, 44 East 23rd Street, New York 10, New York.

INTERNATIONAL COLLEGE OF SURGEONS
November 16, 17, 18, 1959 — **Hot Springs, Virginia**

The Mid-Atlantic Meeting of the International College of Surgeons will be held at the Homestead Hotel, Hot Springs, Virginia on November 16, 17, 18, 1959. For further details contact: E. G. Gill, M.D., State Regent, International College of Surgeons, 711 South Jefferson Street, Roanoke, Virginia.

44th SCIENTIFIC ASSEMBLY
Interstate Postgraduate Medical Association
November 2-5, 1959 — **Palmer House**
Chicago, Illinois

The 44th Scientific Assembly of the Interstate Postgraduate Medical Association will be held in the Palmer House, Chicago, Illinois, November 2-5, 1959. Advance registration fee of $10.00 should be mailed to Erwin R. Schmidt, M.D., Box 1109, Madison 1, Wisconsin. Hotel reservations should be directed to the Palmer House, Chicago.

THE CITATION

MEDICO-LEGAL BRIEFS

Prepared by the Law Department of the American Medical Association

MEDICAL PROFESSIONAL LIABILITY—The Superior Court of New Jersey sustained a verdict of $56,000 against a general practitioner. The Court found that the physician had negligently treated the plaintiff with mycifradin (neomycin), an antibiotic, and that as a result of this negligent treatment the plaintiff, who was forty-eight years old, would be deaf and tormented by tinnitus for the rest of his life. The defendant admitted he had never used the drug before using it on the plaintiff. He insisted that in all substantial respects he followed the manufacturer's directions. The evidence showed that the plaintiff had indications of "intrinsic renal disease" or "impaired renal function." The manufacturer's brochure warned that "under such conditions the benefits that may be derived . . . should be weighed against the possible development of deafness." The plaintiff's expert testified that in such a case the drug should be used only in cases of extreme urgency. The defendant conceded at the trial that "it was not an emergency."

The Supreme Court held that "the jury had the right to conclude not only that the defendant did not know precisely what organism was ailing plaintiff, but in addition that he failed to exercise reasonable care to find out whether the drug would do any good."

Marchese v. *Monaco*, 145 A. 2d 809 (N. J., Nov. 10, 1958).

PHYSICIAN HELD NOT GUILTY OF MALPRACTICE FOR PATIENT'S ILLNESS FOLLOWING TETANUS ANTITOXIN INJECTION—The Supreme Court, Trial Term, Kings County, Part III, held that a city hospital physician was not guilty of malpractice where the patient, who had received an injection of tetanus antitoxin after sustaining an eye injury, became ill with serum poisoning. The Court found that the physician had administered a scratch test. The Court said that under the circumstances it was accepted practice to administer the antitoxin and that "the doctor was therefore compelled to risk a possible allergic reaction in the absence of any clearly positive indication from the scratch test."

Gorlin v. *Naster Contracting Corporation*, 180 N.Y.S. 2d 84 (N.Y., Oct. 20, 1958).

MEDICAL PROFESSIONAL LIABILITY-UNCONDITIONAL RELEASE — The Supreme Court of New Jersey reversed a summary judgment for a defendant physician and remanded the case for trial. The lower Court held that when the plaintiff, who had been injured in an automobile accident, settled his suit against the original tortfeasor and executed an unconditional release, he barred himself from an action of medical malpractice against the physicians who treated him for these injuries.

The Supreme Court in reversing this decision ruled that the plaintiff was entitled to bring an action against the physicians unless it appeared that he had been fully compensated or that the release was specifically intended to absolve them.

Daily v. *Somberg*, 146 A. 2d 676 (N.J., Dec. 1, 1958).

Further information on the preceding cases may be obtained from the Law Department, American Medical Association, 535 North Dearborn Street, Chicago, Illinois.

Organization News

Delegates Say No to Service Contract for Old Folks

Oklahoma's House of Delegates has squelched a proposal to offer a service-type prepaid health coverage program to the low income elderly. The action came at a special meeting of the policy-making body which was held in Oklahoma City on August 2.

On the preceding day, the Council of the OSMA also disapproved of the proposal developed through the joint efforts of the Blue Cross-Blue Shield Liaison Committee and the Insurance and Retirement Sub-Committee (Committee on Aging). In backing up the Council action, the Delegates reverted to their long standing opposition to a service contract, regardless of age group.

Principle opposition to the measure came from those who questioned the wisdom of self-committment to a below-par fee schedule. It was the majority feeling that such a concession, even on behalf of the elderly, would inadvertently lead the public to believe that the reduced fees would be an acceptable rate of pay for other special interest groups.

In lieu of endorsement of the service contract, the Delegates reaffirmed their previous (April 19) expression of willingness to assist the retired elderly in the financing of health care costs and opened the door for the development of an indemnity program with expanded age limits.

The committee was instructed to continue its study along indemnity lines and to devote its effort to the development of a program for physician services, without assuming responsibility for hospital coverage. The Delegates further suggested that subsequent plans be screened by the Council before resubmission to the higher group.

The Rejected Plan

Ground rules of the proposed plan called for the provision of thirty days of medical and hospital benefits per year and set in-

come limits (those below the limits would receive service benefits) of $2400 per year for an individual and $4500 per year for a couple.

The plan also restricted service benefits to those who had a net worth, excluding homestead, of less than $9,000.

In-hospital service benefits would have covered such services as full charges on semi-private room accommodations, general nursing, drugs, laboratory, and other supplies and services normally covered by the Blue Cross contracts. An allowance of $10.00 per day would have been paid toward private room charges.

A complete range of surgical services would have been compensable at approximately 50% of the Oklahoma Medicare fee schedule. The physician could not bill additional charges if the patient fell below the income and net worth ceilings. Anesthesia and radiology benefits would also be based upon approximately 50% of Medicare.

Payment for in-hospital medical care for non-surgical cases was increased above the 50% rate to compensate for the preponderance of medical cases to be found in this age group. Rates for such care were set at $7.00 for the first day, $5.00 for the second day, $4.00 each for the next thirteen days and $3.00 each for the last fifteen days.

A unique feature of the plan was the arrangement proposed in the event of in-hospital medical care and surgery during the same period of hospitalization. In such cases, the greater fee would be provided and payment for lateral or consultive services to a second physician would be deducted from the greater fee, up to 50% of such fee.

For example, if a surgeon performed a $100 procedure, but found it advisable to seek consultation from an internist, the internist could receive up to $50 of the maximum allowable. The surgeon would then receive $50 for his services.

The proposal excluded such services as home and office visits, cosmetic surgery, custodial care, most clinical lab work and diagnostic x-ray, and also drew the line on pre-existing conditions, TB, dental work, alcoholism, drug addition and chronic mental and nervous disorders. Acute neuro-psychiatric care would be covered on an in-hospital basis for the first fifteen days.

Cost of the proposed plan would be $6.45 per person per month. The reduced rate was not only made possible through the reduced physician's fees, but also by the Oklahoma Hospital Association's agreement to accept payment on an "out-of-pocket" expense basis.

The group which drafted the proposal also recommended that any abuses of a prepayment program for this age group be met with immediate and effective medical society action. Specifically, they suggested that county utilization rates be published periodically in the *Journal* and *OSMA-Scope* and recommended disciplinary procedure which would channel grievances through the Blue Cross-Blue Shield Liaison Committee to the County Society. If results were not obtained thusly, the matter in question would be finally referred to the Grievance Committee.

AMA Request for Action

At the 1958 mid-winter meeting of the American Medical Association in Minneapolis, the AMA House of Delegates took recognition of the problem of an aging population (the number of persons over 65 is increasing at twice the rate of the general population) and took the following action:

" . . . That the American Medical Association, the constituent and component medical societies, as well as physicians everywhere, expedite the development of an effective voluntary health insurance or prepayment program for the group over sixty-five with modest resources or low family income; that physicians agree to accept a level of compensation for medical services rendered to this group, which will permit the development of such insurance and prepayment programs at a reduced premium rate."

OSMA Response

In conformance with the AMA action, the OSMA committees, already concerned with the problems of the aged, held a series of meetings, explored many alternatives and, finally, submitted several general recommendations to the OSMA delegates during the 1959 annual meeting. The recommendations called for the development of a service-type health insurance program for the aged group of limited means and stipulated that physicians and hospitals would be compensated at the highest possible rates in keeping with a saleable premium.

The House of Delegates gave tentative endorsement to the idea and asked the joint committee to develop a specific proposal and submit it to the governing body within ninety days for final judgment.

The committee then set about the development of such a program. Plans from other states were studied and numerous meetings were held with representatives of voluntary prepayment plans and commercial health insurance carriers. The final product of these deliberations was the proposal to offer service coverage to the aging through the voluntary prepayment system.

Other States

The House of Delegates' turndown of the proposal places Oklahoma in a similar position as Texas in breaking away from the pattern being set by most other state societies. When the AMA action was taken in Minneapolis, only eight medical society sponsored Blue Shield Plans had coverage available on initial enrollment for persons over the age of 65. Since then the existing plans have been joined by seventeen additional plans, most of them on a service basis, and today there are twenty-five Blue Shield Plans in twenty-three states which have developed and are offering programs for the aged.

In twenty-three other areas, medical societies are currently working with their plans to define the elements of care to be provided and to establish the scope of benefits to be offered.

Public Hearings Concluded On Forand Bill

Despite promises to the contrary, Representative Wilbur Mills (D., Arkansas), Chairman of the House Ways and Means Committee, yielded to AF of L-CIO inspired pressure and allowed public hearings on HR 4700 during the last weeks of the 86th Congress. Organized medicine joined forces with other groups in opposing the socialistic legislation by launching a nationwide write-in campaign to members of the House of Representatives, especially those serving on the committee, and by parading a select group of witnesses before the lawmakers.

The purpose of the push for late-session activity was thought by informed observers to be a methodical sampling of public opposition and support of the bill. Supporters of the bill desired to place it before the public to test the reaction and thereby polish the proposal for another onslaught during the next congressional session. Despite the progress being made through private industry and the effective testimony presented against the bill, Washington observers feel that the measure will be extremely difficult to defeat during an election year.

HR 4700 represents the second legislative attempt to pass the politically and socially motivated measure which would provide up to 120 days per year of hospital, medical, dental and nursing home care for recipients of social security who are over age 65. The first attempt, which occurred during the 85th Congress, was shelved in the same committee by Chairman Mills, but without benefit of the publicity of public hearings. Union-supported members of the House of Representatives then made some benign changes in the provisions of the bill and once again offered it for unsuspecting public consumption.

Who Said What

During the five days of the hearings, a total of sixty-four witnesses appeared before the Committee, 28 of which testified in favor of the bill, 32 against and four took no position but to merely offer amendments.

The major witnesses testifying for the proposal were Nelson Cruikshank, AFL-CIO; Douglas J. Brown, Dean of the Faculty

of Princeton University; Wilbur Cohen, representing the American Public Welfare Association; Walter Reuther, United Automobile Workers; and Leo Price, testifying for the United Ladies Garment Workers Union.

Among the principal witnesses representing non-medical opponents of the bill were Arthur S. Flemming, Secretary of the Department of Health, Education and Welfare and representatives of the American Farm Bureau Federation, the United States Chamber of Commerce, the Health Insurance Association of America, the American Life Convention, and the Life Insurance Association of America.

Medical associations and allied groups testifying against the bill were the American Medical Association, the American Academy of General Practice, the American Society of Internal Medicine, the American Nursing Home Association, the American College of Pathology, the American Pharmaceutical Society, the American Dental Association, the Blue Shield Commission, and twelve state medical associations (Oklahoma yielded its time allocation in favor of another state which had a congressman serving on the Committee).

The American Nurses Association and the Physicians Forum testified in favor of the bill. Vague testimony of the American Osteopathic Association and the American Podiatry Association offered no position on the bill, but simply asked that their members be included among those qualified to render care.

The Administration Speaks

Highlighting the hearing was the testimony of Mr. Flemming, on behalf of the HEW, who represented the thoughts of the Administration when he appeared as the kickoff witness.

He delivered a strong statement in opposition to the bill, contending that the measure would establish a course from which there would be no turning back—that health coverage of the aged would "become frozen in a vast and uniform governmental system, foreclosing future opportunity for private groups—non-profit and commercial—to demonstrate their capacity to deal with the problem." Fleming said the objective of providing the aged with adequate medical care should be achieved through individual and organized voluntary action. He predicted that 70% of the aged social security beneficiaries would have some form of health insurance by 1965.

AMA Testimony

Doctor Leonard W. Larson, Chairman of the AMA Board of Trustees, and Doctor Frederick C. Swartz, Chairman of the AMA's Committee on Aging, declared that the Forand Bill would result in poorer—not better—health care for the American people. They emphasized that voluntary methods are meeting the challenge of an expanding aging population and will continue to meet the challenge, given the continued opportunity.

The two AMA officials were joined by thirty-three state medical societies in urging the House Ways and Means Committee to reject the controversial Forand legislation to finance health care for the aged through higher social security taxes. A number of the states had representatives appear before the legislators while the others filed written statements with the committee for inclusion in the printed record of testimony.

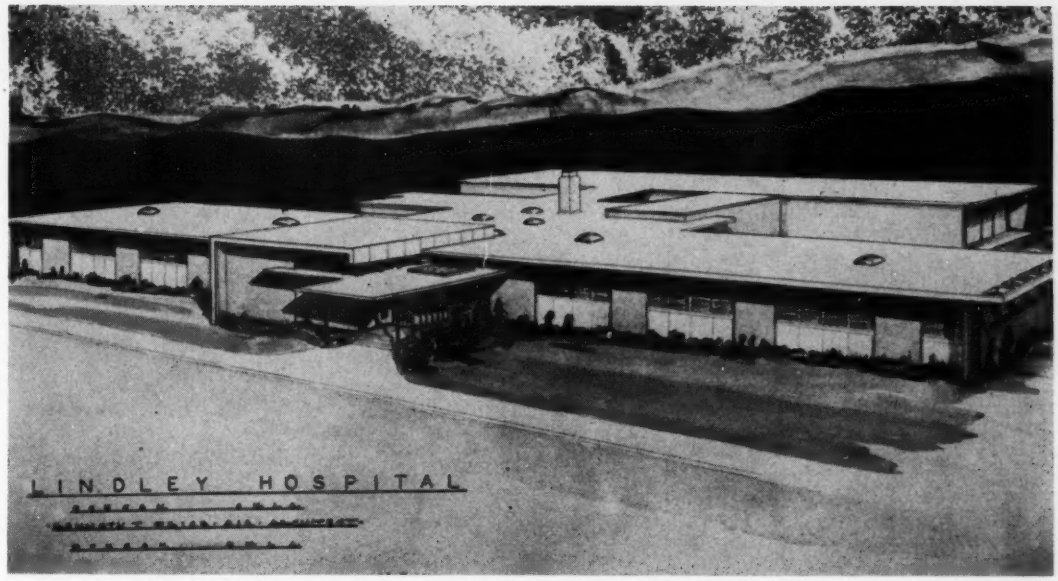
Unamiable Aime

Representative Aime J. Forand (D., Rhode Island), author of the bill, was present at all times and usually had either a comment or question for each witness. For the most part, he did not question witnesses concerning the merits of the bill or their statements, but rather engaged in a discussion of collateral issues. As an example, his questioning of AMA witnesses revolved around the "lobbying" activities of organized medicine.

He also indicated on numerous occasions that he had no intentions of giving up the fight and stated at the conclusion of the hearings, "I am hopeful of action (on the bill) early next year."

OSMA Activities

Under the leadership of the OSMA's National Legislative Committee, the association filed a written statement with the committee and was joined by fourteen county medical societies which mailed in resolutions to the legislators. In addition, over five hundred Oklahomans, both physicians and layman, personally contacted their U.S. Representative and Chairman Mills.



Lindley Hospital Opened in Duncan

The new Lindley Hospital in Duncan was formally opened April 12. The $270,000 structure, located at 10th and Peach Street, covers 18,000 square feet.

Of modern design, the building is constructed of pink face brick over a steel frame and masonry walls. The only wood in the building is used in the doors and walnut paneling of the reception room. Interior walls are plaster over metal.

The 51-bed hospital has 28 patient rooms, including 21 semi-private rooms and seven private rooms. Each room has a private bath, telephone and is equipped with oxygen. A Muzak system has been installed throughout the hospital.

A picture window divides the main lobby and the planitarium where ferns and tropical plants are growing. A three-tier fountain decorates one wall of the reception room.

In addition to the patient rooms, there is an operating room, recovery room, nursery and chapel. Parking facilities for 50 cars have been provided.

Staff of the new hospital includes: E. C. Lindley, M.D., E. H. Lindley, M.D., and D. C. Ryan, M.D.

Architect for the structure was Kenneth T. Price, Sr., Duncan.

Tenants Listed for the New Pasteur Building

Listed among the Oklahoma City physicians who moved into the new Pasteur building, 1111 North Lee, on August 1 are: M. B. Ballina, M.D., M. Thomas Buxton, Jr., M.D., Karl K. Boatman, M.D., William L. Bond, M.D., James S. Boyle, M.D., C. Alton Brown, M.D., David R. Brown, M.D., N. F. V. Barkett, M.D., Earl M. Bricker, M.D., R. E. Carpenter, M.D., Ralph C. Denny, M.D., John R. Danstrom, M.D., Robert B. Howard, M.D., William E. Hood, M.D., Minard F. Jacobs, M.D., Herbert Kent, M.D., Robert W. Kahn, M.D., A. C. Lisle, Jr., M.D., Richard B. Lincoln, M.D.

Also moving were: LeRoy Long, M.D., David C. Lowry, M.D., Elmer R. Musick, M.D., Carter H. Moody, M.D., Haven W. Mankin, M.D., Sam N. Musallam, M.D., Milam F. McKinney, M.D., Thomas E. Nix, Jr., M.D., Charles M. O'Leary, M.D., James B. Pitts, Jr., M.D., Joe M. Parker, M.D., Thomas C. Points, M.D., Moorman P. Prosser, M.D., James R. Reed, M.D., Bob Rutledge, M.D., Clarence Robinson, M.D., Ralph A. Smith, M.D., Charles E. Smith, Jr., M.D., William T. Snoddy, M.D., William Best Thompson, M.D., and Paul M. Vickers, M.D.

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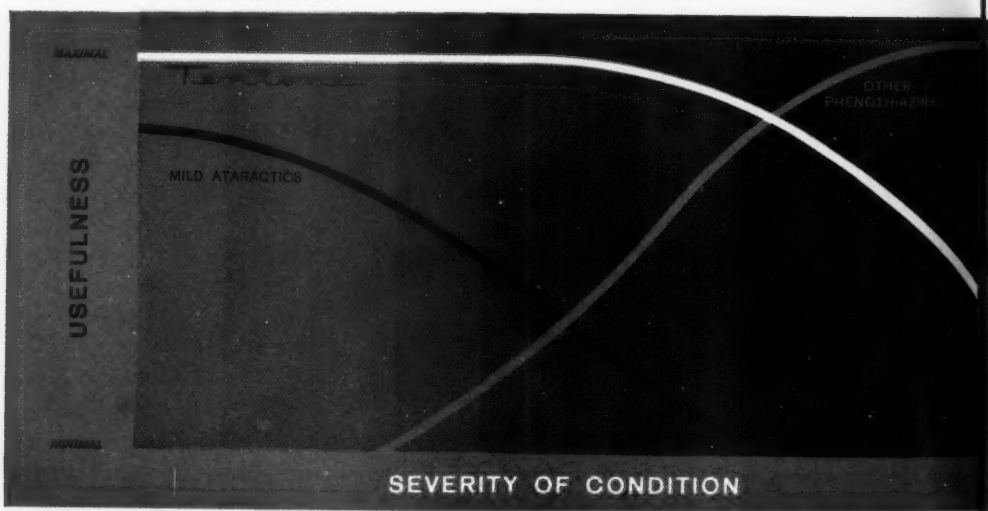

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Plans Announced for Oklahoma City Clinical Society

The Twenty-Ninth Annual Conference of the Oklahoma City Clinical Society will be held in the Biltmore Hotel, October 26, 27, and 28, 1959. Features of the meeting will include: general assemblies, clinical pathologic conference, roundtable luncheons, specialty lectures, dinner meetings and commercial exhibits.

Fifteen guest lecturers have been secured for the three-day conference. Speakers and their fields of medicine include: Robert H. Barter, M.D., Washington, D.C., Gynecology; John A. Campbell, M.D., Indianapolis, Indiana, Radiology; Wm. M. Christopherson, M.D., Louisville, Kentucky, Pathology; George M. Haik, M.D., New Orleans, Louisiana, Ophthalmology; M. Digby Leigh, M.D., Los Angeles, California, Anesthesiology; Daniel W. Lewis, M.D., Philadelphia, Pennsylvania, Medicine; H. Relton McCarroll, M.D., St. Louis, Missouri, Orthopedic.

Also appearing will be: Robert M. Moore, M.D., Galveston, Texas, Surgery; Roy T. Parker, M.D., Durham, North Carolina, Obstetrics; Frederick C. Robbins, M.D., Cleveland, Ohio, Pediatrics; Sam H. Sanders, M.D., Memphis, Tennessee, Otolaryngology; John H. Talbott, M.D., Buffalo, New York, Medicine; Gershom H. Thompson, M.D., Rochester, Minnesota, Urology; Rupert B. Turnbull, M.D., Cleveland, Ohio, Surgery; and J. Walter Wilson, M.D., Los Angeles, California, Dermatology.

Registration fee of $20.00 includes all features. Further information may be obtained by writing to Executive Secretary, 503 Medical Arts Building, Oklahoma City, Oklahoma.

Three Oklahomans Certified By Board of OB-GYN

One Oklahoma City and two Tulsa physicians have been certified by the American Board of Obstetrics and Gynecology. Those awarded the certifications on May 16, 1959 were: Farris W. Coggins, M.D., 1100 North Dewey, Oklahoma City; Eugene S. Cohen, M.D., 2021 South Lewis, Tulsa; and Houston F. Mount, M.D., 3102 South Harvard, Tulsa.

Ritzhaupt Honored by State Senate

Senator Louis H. Ritzhaupt, Guthrie physician, was honored during the closing days of the 27th Legislature when his fellow lawmakers took recognition of his years of service to his state and presented him with a commendatory resolution.

The resolution reads as follows:

Whereas, Senator Ritzhaupt has sacrificed the time otherwise available for a distinguished medical career to serve in the State Senate since 1933 when he was a member of this body in the Fourteenth Legislature; and

Whereas, with the exceptions of the Twenty-fourth and Twenty-fifth Legislatures, Senator Ritzhaupt has been present for every session of the legislature since that time; and

Whereas, Senator Ritzhaupt has been a leader in the enactment of some of the most significant legislation produced during his tenure, particularly in the fields of public health, highways, education, public safety and care of crippled children; and

Whereas, Senator Ritzhaupt has served as chairman of such important committees as Public Health and Planning and Resources and has rendered outstanding service on the Education Committee, as well as many others; and

Whereas, such a long and distinguished career deserves the expressed approbation and appreciation of his colleagues.

Now, therefore, be is resolved by the Senate of the Twenty-Seventh Legislature of the State of Oklahoma:

That the members of this, the State Senate of the Twenty-seventh Legislature of the State of Oklahoma, now duly assembled and acting for themselves and on behalf of the people of the State of Oklahoma, do hereby commend Senator Louis H. Ritzhaupt for his long years of legislative service and his many contributions and achievements in that capacity; and

Be it further resolved that a properly prepared copy of this resolution be sent to the Guthrie Daily Leader, Guthrie, Oklahoma.

Adopted by the Senate the 23rd day of June, 1959.

HAROLD T. GARVIN,
President Pro Tempore of the Senate.

New Ardmore Sanitarium And Hospital Opened

On May 10, the new Ardmore Sanitarium and Hospital was formally opened with ceremonies on the steps of the new building, followed by an open house from 2 to 7 p.m.

Of contemporary design, the H-shaped structure utilizes 17,000 square feet of floor space. Modern decor of pastel colors is used on the interior of the brick building.

The 53-bed hospital includes a convalescent wing with 14 beds for elderly retired patients. Plans are being formulated now to add a 75-bed wing to accommodate a larger group of this type of patient.

One of the unique features of the hospital is a complete hydrotherapy department. The surgery suite is equipped with the newest equipment, including cardioscope and cardiophone equipment, making it possible to take care of any emergency which might occur during operations.

Funds for the new $300,000 sanitarium were made available through the Seventh Day Adventists Conference, Ardmore business men, the Ford Foundation, local church members and churches of Oklahoma. The Ardmore Sanitarium and Hospital is one of 122 hospitals that the Seventh Day Adventist Church operates throughout the world.

Conveniently located on an 11-acre tract on 12th Avenue, N.W., just off of Highway 77, the sanitarium has parking for 75 automobiles.

Have You Heard?

G. A. COMP, M.D., Manitou physician, recently retired and has moved to Norman. Doctor Comp had been in active practice for nearly 53 years at the time of his retirement.

W. N. OXLEY, M.D., formerly of Texhoma and Guymon, is in Vienna, Austria taking a six weeks advanced course in surgery. Doctor Oxley plans to re-establish his practice in Guymon upon his return.

FRED L. PATTERSON, JR., M.D., of Duncan, will join the staff of the Veterans Administration Hospital in Huntington, West Virginia on August 3. Doctor Patterson, who has practiced in Duncan since 1946, will be assistant chief medical examiner in Huntington.

ROBERT A. MCLAUCHLIN, M.D., Oklahoma City physician, has announced the opening of his new offices located at 1200 North Walker.

W. ALBERT COOK, M.D., retired Tulsa physician, recently observed his 85th birthday. Doctor Cook was the first President of the Tulsa County Medical Society. He served as President of OSMA in 1917-18 and for 21 years was a delegate to the American Medical Association.

Returning to Work Today Or Next Month?

Let your patient's return to work be governed by good medical practice and not by the expiration of unavoidable absence benefits.

"Doctor, when can I go back to work?" What your reply to that familiar question will be should be based on good medical practice rather than on financial consideration. The patient with adequate health and accident insurance will be quite willing to abide by the physician's recommendations and wait patiently for normal convalescence to take place—provided his benefits hold out that long. With the expiration of insurance benefits, a new symptom may appear: "Hospitalitis" and with the onset of this condition in a convalescing patient, there will be increasing pressure on the physician for early release even though good medical practice may dictate a longer convalescence.

When industry today favors early return to work as a means of reducing the tremendous cost of absenteeism, the crux of the matter in a decision for release to work must still be: Can the patient be returned to work without jeopardizing his health?

Should you be faced with a long convalescence in a patient whose benefits have expired, you will usually find industry very cooperative in the rehabilitation of your patient by setting up a part-time work schedule. It is a real morale boost to the convalescent cardiac, for example, to be able to spend even one or two hours per day at his job. In the case of office workers, a part-time work schedule can oft'times be arranged. In the case of manual laborers, or those employed in jobs which come under labor negotiations, it has been virtually impossible for industry to set up part-time schedules even for rehabilitation purposes, as this practice is usually strictly forbidden in the working contract. For all other jobs not bound by labor negotiations, you will find industry ready to assist you in your patient's early return to work. Should temporary work restrictions be necessary to assure complete recovery, a telephone visit with the plant physician or employee's supervisor will greatly facilitate early, safe return to work for your patient.

Prepared by OSMA Committee on Occupational Medicine

Delegates Report on A.M.A. Meeting

The following reports from Oklahoma's Delegates to the American Medical Association were prepared for publication in *The Journal:*

Doctor Phelps

The official summary of the House of Delegates of the A.M.A. meeting in Atlantic City, June 8-12 appeared in the June 29 issue of the *Journal of the A.M.A.* I hope that each member of the Oklahoma State Medical Association will read this report carefully.

It seems to the writer that the progressionism trend which started about two years ago was accelerated.

Action by this house of delegates ended the hostility to closed panels and backed down from the principal of no compromise with medical care plans which restrict free choice of physicians.

The House of Delegates even exhibited restraint on condemning socialized medicine.

An Arizona resolution that would have reaffirmed A.M.A. resistance to "the ultimate complete socialization of the medical profession" was watered down and adopted as a rather meaningless generalization to the effect that organized medicine should scrutinize federal programs which "might lead to socialized medicine."

While the house did not go as far as the judicial council recommended, steps were taken toward professional liaison with osteopathy. Such moves were soundly defeated a few years ago.

Although increasing numbers of medical societies have been supporting compulsory inclusion of physicians into social security, the House of Delegates did stand firm in opposition. It is to be hoped that in the next few months more members will take the time to actually make a study of this so called "social security." Intelligent study will reveal the fraudulence of this socialistic gimmick. Too many otherwise intelligent people accept the false propaganda disseminated by bureaucrats, anxious to promote their power and perpetuate their jobs, rather than obtain the true facts about social security.

This trend toward the left may be the product of a new accent on flexibility by the management consultants and their influence on the board of trustees.

Since reorganization the policy seems to be to go easy on Washington lobbying, avoid quarrels over fundamental principles with anyone, especially labor bosses and adopt a tolerant or even submissive attitude toward medico-economic reforms once branded as socialistic.

Several members of the O.S.M.A. were present through the four days of meetings. Several appeared before reference committees and expertly presented the views of the Oklahoma physicians.

Doctor Wilkie Hoover worked tirelessly and was ably assisted by Doctors R. Q. Goodwin and Joe Duer, the alternate delegates. Doctor John F. Burton, member of the Council on Medical Service, and our president, Doctor A. T. Baker, attended all meetings. Doctor Showman of Tulsa, the delegate from the Section on Dermatology, gives this state another delegate. He is of great help to the other two Oklahoma delegates.

Bill Kirkham of the O. U. Medical School and President of the Student American Medical Association spoke to the House of Delegates. His talk made us all swell with pride and we are happy to claim him as one of the representatives of Oklahoma medicine.

As usual, Jack Spears, Executive Secretary of the Tulsa County Medical Society, and Don Blair, the Associate Executive Sec-

retary of the O.S.M.A. were close observers at the sessions and rendered valuable assistance to all of the Oklahoma physicians present.

Next December the interim session of the A.M.A will be in Dallas. I sincerely hope that each member of the O.S.M.A. will attend the meetings of the House of Delegates and the reference committees at that time.

Your delegates welcome your advice and suggestions and will do everything in our power to present your views and assist all members of the O.S.M.A. in every way that we can.—*Malcom E. Phelps, M.D.*

Doctor Hoover

The American Medical Association held its 108th Annual Medical Meeting in Atlantic City, New Jersey June 8 through June 12, 1959. The highlight of this meeting was the address of the President Dwight D. Eisenhower who spoke before an over-flow audience on Tuesday night on the occasion of the inauguration of Doctor Louis M. Orr of Orlando, Florida, as the 113th president of the A.M.A. No president of the United States had addressed an A.M.A. annual or clinical meeting previously.

Doctor E. Vincent Askey of Los Angeles, California was elected president-elect of the A.M.A., Doctor Stanley Kenney of New York became Vice President. Doctor Norman Welch of Boston, Massachusetts was elected speaker of the house of delegates and Doctor Milford O. Rouse of Dallas, Texas was named Vice Speaker. Trustees Rufus Robbins of Arkansas and Hugh Hussey of Washington, D. C. were re-elected to succeed themselves. Doctor Percy Hopkins of Chicago was named a trustee to fill the unexpired term of Warren Furey.

One of the most important matters considered by the house of delegates was the report o the Commission on Medical Care Plans. While the house of delegates endorsed "Free choice of Physician" as an important factor in the provision of good medical care the house requested the following recommendation be transmitted to all constituent medical associations:

"In order that the principle of free choice of physician be maintained and be fully implemented, the medical profession should discharge more vigorously its self-imposed responsibility for assuring the competency of physicians services and their provision at a cost which people can afford."

The house took a stand which virtually approved closed panel medicine by implication. No firm statement of policy came forth and the house adopted a recommendation which declares that "those who receive medical care benefits as a result of collective bargaining should have the widest possible choice from among medical care plans for the provision of such care."

The osteopathic question was again given serious study and the house of delegates softened the A.M.A. attitude regarding doctors of medicine teaching in osteopathic colleges providing said college is in the process of being converted into an approved medical school under the supervision of the A.M.A. Council on Medical Education and Hospitals. They also recommeded that a liaison committee be appointed by the Board of Trustees of the American Medical Association to meet with representatives of the American Osteopathic Association, if mutually agreeable, to consider problems of common concern including inter-professional relationships on a national level.

A briefing of the actions of the A.M.A. house of delegates was printed in the June 27, 1959 issue of the *Journal of the American Medical Association.* I suggest that all members of the Oklahoma State Medical Association read this interesting summary.

Doctor Malcolm Phelps, your other delegate, attended all sessions and served on an important committee at this meeting. He as well as alternate delegates, R. Q. Goodwin and Joe Duer worked admirably in behalf of the Oklahoma State Medical Association. Doctor W. A. Showman of Tulsa served as a delegate from the Section of Dermatology and worked closely with the Oklahoma Delegation. Your president, Doctor Alfred T. Baker also attended all sessions of this meeting. Mr. Don Blair and Mr. Jack Spears were also present and were of invaluable assistance.—*Wilkie D. Hoover, M.D.*

BLUE CROSS PERCENTAGE UTILIZATION BY COUNTY

HOSPITAL CARE USED—1958 AVERAGE COMPARED TO AVERAGE FOR FIRST QUARTER OF 1959

County Name	1958	1st qtr. 1959	County Name	1958	1st qtr. 1959
Adair	122.0	90.9%	Lincoln	108.5	95.9%
Alfalfa	90.1	87.0	Logan	57.1	43.5
Atoka	92.0	88.5	Love	76.4	110.3
Beaver	100.5	83.2	McClain	89.3	95.9
Beckham	101.2	109.1	McCurtain	113.0	131.5
Blaine	115.0	95.9	McIntosh	66.4	82.9
Bryan	70.5	60.9	Major	97.8	100.3
Caddo	97.1	84.1	Marshall	93.8	64.1
Canadian	83.3	67.5	Mayes	92.6	73.3
Carter	92.3	74.9	Murray	69.1	121.1
Cherokee	113.3	110.9	Muskogee	78.4	77.0
Choctaw	106.7	120.6	Noble	98.0	79.0
Cimarron	88.7	96.8	Nowata	120.3	110.8
Cleveland	84.8	76.7	Okfuskee	91.5	71.8
Coal	126.6	106.2	Oklahoma	78.1	66.6
Comanche	89.9	102.9	Okmulgee	95.4	92.0
Cotton	91.6	71.4	Osage	102.3	124.2
Craig	98.4	129.2	Ottawa	101.8	106.0
Creek	109.9	128.5	Pawnee	109.3	102.2
Custer	104.2	69.6	Payne	93.0	75.4
Delaware	100.9	142.7	Pittsburg	103.9	115.5
Dewey	86.7	73.2	Pontotoc	101.0	97.7
Ellis	79.0	69.0	Pottawatomie	84.5	88.1
Garfield	115.0	110.9	Pushmataha	113.0	87.6
Garvin	75.0	91.7	Roger Mills	111.6	125.4
Grady	77.0	58.2	Rogers	96.4	95.3
Grant	106.4	101.4	Seminole	78.5	57.4
Greer	81.5	65.4	Sequoyah	89.7	219.3
Harmon	60.6	62.5	Stephens	97.0	96.7
Harper	90.1	117.0	Texas	118.1	105.2
Haskell	73.3	93.3	Tillman	115.4	85.6
Hughes	106.1	81.7	Tulsa	103.8	91.5
Jackson	82.6	82.3	Wagoner	97.6	69.3
Jefferson	133.5	142.3	Washington	100.5	103.5
Johnston	74.0	70.2	Washita	108.4	72.0
Kay	90.3	80.3	Woods	107.2	97.0
Kingfisher	81.9	65.9	Woodward	91.4	100.9
Kiowa	88.2	92.2			
Latimer	114.8	138.2			
LeFlore	86.9	95.0	Average	94.6	93.8

NOTE: Utilization is on a paid basis and does not include reserves, operating expenses, nor any estimated retroactive payments.

Released at the request of the Blue Cross-Blue Shield Liaison Committee for the Information and Education of OSMA members.

Auxiliary News

Oklahomans Receive Appointments

Two "top" leaders in the Woman's Auxiliary to the Oklahoma State Medical Association have been requested to fill "top" spots in the American Medical Auxiliary for 1959-60. Mrs. Neil W. Woodward, Oklahoma City, is National Civil Defense Chairman; Mrs. E. Clyde Mohler, Ponca City, is Area Legislative Chairman for five southern states, including Oklahoma.

Civil Defense

Public apathy to the term "Civil Defense" is difficult to understand. When this attitude first became apparent to leaders in civilian defense several years ago, new approaches on community bases seemed the answer. Since we are attempting projects on the basis of "individual responsibility," we should consider all possibilities.

To the pessimistic who state that so long as there is military and national unconcern; that so long as each household or immediate neighborhood is without protection if no bomb shelter is available, we first can stress the need for basic precaution. Adequate stocks of dressings, water, food, all of the material listed originally in the "grandma's pantry" idea, are basic. To approach the importance of first-aid training, essential home nursing, and minimal protection, perhaps we should enter the back door of Civil Defense.

Would it be logical to sub-title this program "Survival?" Perhaps disinterested persons, or those skeptical of the value of Civil Defense, could think in terms of survival during other disasters and realize that the necessity for preparedness is all inclusive, encompassing flood, tornado, earthquake, hurricane. Also to be considered are man-made disasters irrespective of atomic development: wrecks involving planes, trains, buses, explosions.

Regardless of title of sub-title, preparedness for emergency situations is essential in every community, and we are extremely thankful that this important phase of our Auxiliary is in the capable hands of Mrs. Woodward.

Legislation

How does an Auxiliary member become and keep well-infromed on legislative matters, especially those directly affecting the medical profession? If she looks carefully and at the proper time, there are sometimes short articles inconspicuously placed inside in local newspapers. Occasionally, a cryptic editorial might mention H.R. 10—or in the future, we can hope, Senator Sparkman's S. 3194. Regardless, sedulous searching is required.

If you are a new member, or a not so well-informed older member and your time is valuable, the *Bulletin*, official organ of American Medical Auxiliary, is invaluable. The *Bulletin* is published quarterly; the price is $1.00 a year. Second, attend Auxiliary meetings regularly for reports from your county Legislation Chairman. If you have questions concerning pending legislation which are not answered in her report, ask them.

If and when an emergency arises and we are asked to write our congressmen and to contact friends and neighbors for their support(as we have been requested in the past), each Auxiliary member can be contacted within an hour by our telephone committee system.

Prior to emergency contact, other than our ability to function as a group for direct action, it is most important that we can possess sufficient knowledge to answer questions intelligently and convincingly. Mrs. Mohler, as our Area Legislative Chairman, will assist us directly in our five-state southern area.

Because we are an Auxiliary concerned with "individual responsibility," we sincerely wish a fine year ahead to both of our national representatives.

Deaths

DONALD LAWSON OESTERREICHER, M.D.
1921-1959

Donald Lawson Oesterreicher, M.D., Norman physician, died on July 8, 1959.

A native of Dixie, Georgia, Doctor Oesterreicher graduated from the University of Georgia and in 1949 graduated from the University of Oklahoma School of Medicine.

Doctor Oesterreicher took a residency in surgery at the University of Oklahoma Hospitals from 1950 through 1954. He was then appointed Chief of Surgery at Central State Hospital in Norman, a position he held at the time of his death.

He was a member of the Oklahoma State Medical Association and the American Medical Association.

WILLIAM H. MCBRAYER, M.D.
1871-1959

William H. McBrayer, M.D., 87-year-old Idabel physician died June 25, 1959.

Born in Ogreeta, North Carolina, Doctor McBrayer graduated from Chattanooga Medical College in 1902. He came to McCurtain county, locating at Goodwater, Indian Territory for five years before moving to Haworth in 1905. He remained at Haworth until 1945 when he moved to Idabel.

In 1954, Doctor McBrayer was honored for his years of service to the medical profession when the Oklahoma State Medical Association presented him with a 50-Year-Pin.

CHARLES WALLIS OHL, M.D.
1909-1959

Charles Wallis Ohl, M.D., 49-year-old Chickasha physician, died June 26, 1959 in Chickasha.

A native of Vineland, New Jersey, Doctor Ohl graduated from the Hahneman Medical School in Philadelphia in 1937. The following year he came to Chickasha where he practiced continuously except for five years spent in the military service.

Doctor Ohl was a member of the Oklahoma State Medical Association and the American Medical Association.

WILLIAM H. COOK, M.D.
1878-1959

William H. Cook, M.D., 81-year-old retired Chickasha physician, died July 12, 1959.

Born in Putnam County, Missouri in 1878, Doctor Cook graduated from Washington University School of Medicine in 1907. He had practiced in Chickasha since 1909.

In 1951, Doctor Cook was honored for his years of service to the medical profession when the Oklahoma State Medical Association presented him with a Life Membership. In 1957, the Association awarded him a 50 Year Pin in recognition of a half century of medical service.

SIDNEY MOORE RICHEY, M.D.
1869-1959

Sidney Moore Richey, M.D., a retired pioneer Tulsa physician, died June 10, 1959.

A native of Delaware, Ohio, Doctor Richey graduated from St. Louis College of Physicians and Surgeons in 1895. After practicing in Minden, Missouri for a few years, he established his practice at Francis, Oklahoma where he remained for 26 years, moving to Tulsa in 1926. He retired in 1941.

Doctor Richey was an Honorary Member of the Oklahoma State Medical Association.

25 YEARS AGO

Articles published in *The Journal* of the Oklahoma State Medical Association, August, 1934.

FOREIGN SURGICAL CLINICS

John F. Park, M.D., F.A.C.S., McAlester

During a visit to some European clinics, procedures of interest were observed which differed from the accepted procedures in the foremost clinics in America. In no sense is this a critical comparison.

With few exceptions, all European surgeons are agreed that partial gastrectomy is the operation of choice in all types of chronic duodenal and gastric ulcer. Finsterer of Vienna, in 529 cases of duodenal ulcer did a gastric resection in 97.5 per cent, and a gastro-enterostomy in 2.5 per cent.

For bleeding peptic ulcer, Finsterer of Vienna recommends partial gastrectomy advocating prompt operation, while von Eiselberg also of Vienna transfuses in bleeding ulcer and if the hemorrhage is not controlled then resects the stomach, but stated that only rarely was the hemorrhage not controlled by transfusion.

Jirasek, Prague, states that more and more patients with hyperplastic toxic goitre are seen each year, and they all come late for treatment, that they are usually in a very serious condition and that as a result his operative mortality is 10 per cent. He attributes the increase in the number of toxic goitres to the taking of iodine.

Gynecology

In fibroid of the uterus, hysterectomy when done by the abdominal route was invariably done supravaginally, the only exception being Strassman of Berlin who routinely does a complete hysterectomy. His statistics show carcinoma develops in 5 per cent of the cervices when left. The cervix is covered usually by peritoneum, but the round ligaments and the adnexal pedicles are but rarely sutured to the cervical stump.

Anesthetics

The anesthetic of choice in most clinics is ether through a closed mask with a rebreathing bag. Spinal anesthesia has its advocates, while others employ local anesthesia almost exclusively. Avertin is used in but few cases, and gas was used in only one clinic.

Miscellaneous

Allessandri withdraws 10 cc. of spinal fluid and after giving spinal anesthetic of tutocam, he injects the 10 cc. of spinal fluid into a vein in order to prevent headache and to decrease the incidence of urinary retention.

Strassman (Berlin) scrubs his hands for ten minutes, washes in sterile water for five minutes, and then dusts his hands with dry boric acid powder; he also places boric acid powder in the fat layer of the abdomen after the fascia has been closed in suppurative cases, claiming that it lessens infection and postoperative cystitis. For drainage he uses ostrich feather and pigeon feather quills with wicks. He does not routinely remove the appendix when doing a hysterectomy, believing that it increases the operative mortality; in fact in no clinic was incidental appendectomy observed.

In cases of non-union of bone Schmeiden withdraws 25 cc. of the patients blood and injects it between the fragments and the ends of the bone to stimulate callus formation. This repeated every two weeks.

In one clinic in Rome they were filling the bone cavity in osteomyelitis with a mixture of plaster of paris iodoform. The results were not too brilliant.

Books Received

The following books have been received by *The Journal* office. As space permits and the context warrants, books will be reviewed.

Biosynthesis of Terpenes and Sterols. G. E. W. Wolstenholme and Maeve O'Connor, Little, Brown & Company, Boston, Massachusetts. Price $8.75.

Childbearing Before and After 35. Adrien Bleyer, M.D., Vantage Press, New York. Price $2.95.

Diseases of Women. Ten teachers under the direction of Frederick W. Roques, The Qilliams & Wilkins Company, Baltimore, Massachusetts. Price $8.00.

A Doctor Remembers. Edward H. Richardson, Vantage Press, Inc., New York. Price $3.95.

Hearing, A Handbook for Laymen. Norton Canfield, M.D., Doubleday & Company, New York. Price $3.50.

Insulin Treatment in Psychiatry. Max Rinkel, M.D. and Harold E. Himwich, M.D., Philosophical Library, New York. Price $5.00.

Patient Care and Special Procedures in X-ray Technology. Carol Hocking Vennes, R.N. and John C. Watson, R.T., C. V. Mosby Company, St. Louis, Missouri. Price $5.75.

Now or Never. Smiley Blanton, M.D., with Arthur Gordon, Printice-Hall, Inc., Englewood Cliffs, New Jersey. Price $4.95.

Pediatric Neurology. Stanley S. Lamm, M.D., Landsberger Medical Books, Inc., New York. Price $12.90.

Questions and Answers in Anatomy. Stanley D. Miroyiannis, Ph.D., Vantage Press, New York. Price $5.00.

Regulation of Cell Metabolism. G. E. W. Wolstenholme, O. B. E. and Cecilia M. O'Connor, B. Sc., Little, Brown & Company, Boston, Massachusetts. Price $9.50.

PHYSICIAN PLACEMENT

General Practice

Donald D. Arthurs, 3240 N.W. 26th St., Oklahoma City, Oklahoma, age 27, married, graduated from Oklahoma University School of Medicine, 1958, available immediately. No military obligations.

Johnny Bill Delashaw, 1905 1st Avenue, N., Texas City, Texas, age 25, married, graduated from University of Texas Medical Branch, 1959, will be available upon completion of internship, July, 1960.

Louis E. Harrington, M.D., Danbury, Iowa, age 37, married, graduated from Wayne University College of Medicine, Detroit, Michigan, 1949, veteran, will be available September, 1959.

John Leland Hudson, M.D., 9 Anna Sue Road, Van Buren, Arkansas, married, graduated from the University of Arkansas, 1955, veteran, available since April 7, 1959.

Robert Emmett Myers, M.D., 872 Ravine Drive, Cleveland 12, Ohio, age 28, married, graduated from University of Arkansas, 1955. Would like to do general practice with emphasis on pediatrics, veteran, will be available September, 1959.

Peter Pappas, Jr., M.D., 513 N. Louise Street, Atlanta, Texas, age 35, married, graduated from University of Texas, 1954, veteran, will be available July 1, 1959.

Wyatt Bibb Pouncey, M.D., 118 Louise Lane, San Mateo, California, age 34, married, graduated from University of Alabama, 1950, veteran, available immediately.

Robert Glenn White, Jr., M.D., 431 Saratoga, San Antonio, Texas, age 26, married, graduated from University of Oklahoma, 1956, presently in military service, will be available August 2, 1959.

Thomas S. Whitecloud, M.D., 858 Market Street, Pascagoula, Mississippi, age 45, married, graduated from Tulane, 1943, veteran, has an interest in teaching and wishes to get into small hospital work, availability date depends upon situation.

Internal Medicine

Doss O. Lynn, M.D., 6101 16th Street, N.W., Washington 11, D.C., age 47, married, graduated from University of Oklahoma, 1937, board certified in internal medicine and cardiology, will have completed 21 years active service September 1, 1959, prefers institutional or industrial practice, will be available after September 1, 1959.

Vanis Pennington, M.D., 1440 W. Bethune, Apt. 402, Detroit, Michigan, age 30, married, graduated from University of Tennessee, 1953, veteran, will be available December, 1959.

John H. Prodell, Jr., M.D., 115 South Mall, Willow Lawn, Richmond 30, Virginia, age 38, married, graduate of Harvard, 1947, veteran, will be available July 1, 1959.

Locum Tenens

Frank H. Cooper, M.D., will complete internship at St. John's Hospital, Tulsa, on July 1. Would like to have locum tenens in general practice for two weeks, available any time after July 1.

B. Anthony Linn, M.D., Veterans Administration Hospital, 4500 S. Lancaster Road, Dallas 16, Texas, will finish residency in Ophthalmology in July, graduate of the University of Oklahoma, 1956, licensed to practice in Oklahoma, would like to have a locum tenens for two weeks during the summer of 1959.

Don Allen Mills, M.D., 3911 Burns Place, S.E., Washington, D.C., age 34, married, veteran, graduated from Georgetown University School of Medicine, 1958, wants to do general practice for two years prior to specialized training. Will be available July 1, 1959.

Obstetrics and Gynecology

Robert Lee Crews, M.D., 5040th USAF Hospital, Anchorage, Alaska, age 31, married, graduate of Vanderbilt, 1954, board eligible, will be available July, 1960, upon completion of military service.

Gerald R. Keilson, M.D., Medical Arts Building, Dallas, Texas, age 31, married, graduated from University of Texas, 1953, board qualified, veteran, will be available in July of 1960.

Milton Gardner Mutch, Jr., M.D., 423 Mills Avenue, Fargo, North Dakota, age 31, married, graduated from University of Minnesota, 1955, will be Board eligible upon completion of fellowship, veteran, will be available July 1, 1959.

Otolaryngology

Joseph E. Walthall, M.D., 1673 West Broadway, Anaheim, California, age 37, married, graduated from Duke University, 1946, board certified in Otolaryngology, veteran, will be available in approximately three months.

Pediatrics

Prentiss Edwards Findlay, M.D., 1500 Wakefield Place, New Orleans 22, Louisiana, age 29, married, graduated from Emory University, Atlanta, 1954, noneligible for military service, will be available July 15, 1959.

Radiology

Thomas A. Lynch, M.D., 7009 N. 17th Street, Tacoma, Washington, age 39, married, graduated from University of Washington, 1950, board certified, veteran,

availability date depends on circumstances of new position.

Surgery

(Name on Request) 32 years old, married, graduated from Tulane, 1952, veteran, board eligible in surgery.

Valerio J. Federici, M.D., 2401 West Toronto Street, Philadelphia, Pennsylvania, age 36, married, graduated from Jefferson Medical College, 1948, veteran, is now available.

Owen Foster Kline, Jr., M.D., 4712 Warrington Drive, Flint, Michigan, married, graduated from University of Colorado, 1954, not eligible for military service at the present time, will be available July 1, 1959.

General Surgery

Frank L. Lanuti, M.D., 215 S. Randall Avenue, Madison 5, Wisconsin, age 38, married, graduated from University of Illinois, 1953, board eligible in general surgery, veteran, will be available July 1, 1959.

Clyde William Draughon, M.D., McGuire Hospital, Box 27, Richmond, Virginia, age 35, married, graduated from University of Oklahoma School of Medicine, 1954, veteran, will be available July 1, 1959.

Sam Leslie Robinson, M.D., University Medical Center, Jackson, Mississippi, age 30, married, graduated from University of Tennessee, 1953, will be available July, 1961, on completion of residency.

MISCELLANEOUS ADVERTISEMENTS

17 BED hospital, clinic and equipment for sale. Prefer to sell all to one buyer in attractive package offer, but will consider other offers. Equipment includes X-ray, fluoroscope, Medco Sonalator, BMR, diathermy, etc. In settling estate of Charles W. Ohl, M.D., facilities and equipment will be sold at considerably less than original cost, and time payments may be arranged. Contact Walt Allen, Co-Executor, 116 North 4th Street, Chickasha, Oklahoma.

WANTED: General Practitioner—Five man established group. Prefer locum tenens for one year. Will meet competitive salary requirements for qualified man. Contact H. B. Landholt, Business Manager, Physicians & Surgeons Clinic, Box 711, Holdenville, Oklahoma.

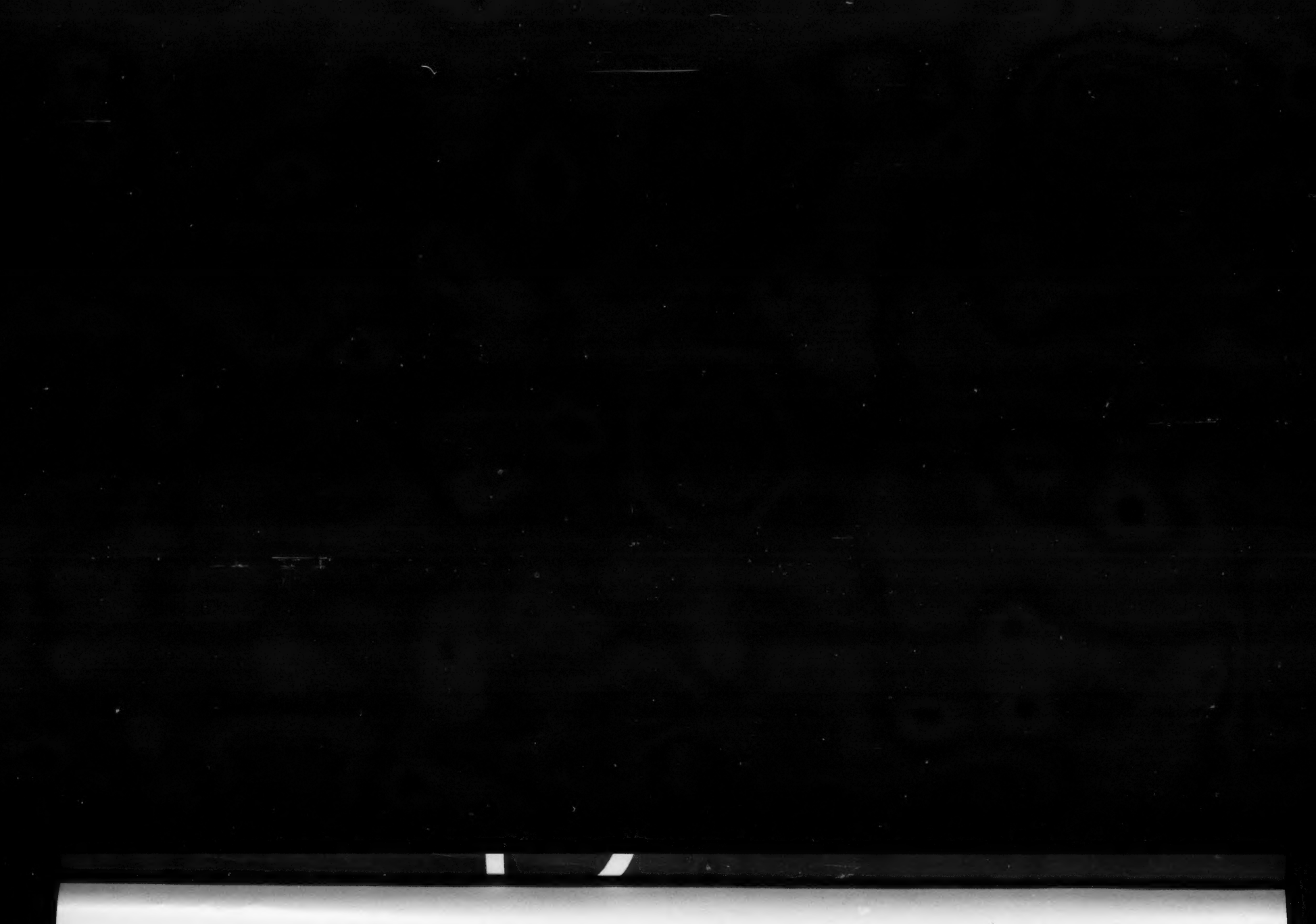
TO SUB-LET: Six months beginning August, 1959, lease then available for five years. Suite 860 square feet. Frew Building, 528 N.W. 12th, William Best Thompson, M.D.

FOR SALE: Hamilton Pediatric table #9888, tan finish, grey upholstery, new condition. Worden walnut consultation room furniture, new condition. Also used equipment sufficient to equip small office. Contact W. P. Jeter, M.D., 912 S.W. 50, ME 2-1556, Oklahoma City.

WANTED: Late model Electrocardiograph. Write Key B, The Journal, Oklahoma State Medical Association, P.O. Box 9696, Oklahoma City, Oklahoma.

WANTED: University Health Physician, man or woman. Salary depending upon experience. Approximately 9,500 students. Fifty bed hospital. Contact Roxie A. Weber, M.D., Director University Health Service, Oklahoma State University, Office of University Infirmary, Stillwater, Oklahoma.

PHYSICIAN NEEDED in Konawa, Oklahoma. Population 3,000 with no M.D. Building and some equipment available; also possibility that community will construct and equip modern clinic. Contact Robert D. Peercy, Box G, Konawa.

REGISTERED LABORATORY TECHNICIAN: Major oil company in progressive southwestern community of 25,000 has opening for female registered laboratory technician for complete clinical laboratory. 40-hour work week. Excellent employee benefits. Give education, experience, and salary requirements in initial letter and include photograph. Write Key F, THE JOURNAL, Oklahoma State Medical Association, P.O. Box 9696, Oklahoma City, Oklahoma.

FOR SALE: One 220 KV Westinghouse Deep Therapy X-ray Unit, complete with complete set of treatment cones, including intermediate therapy cone set and release treatment stretcher. Price: $5,000. Owner may be contacted via CE 2-5501 or P.O. Box 1825, Oklahoma City, Oklahoma.